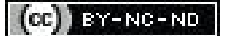


Impact of Caesarean Audit on Caesarean Section Rates using Robson Classification: A Retrospective Observational Study

YAZHINI ARJUNAN¹, S SWATHI², KP MOHANA SUNDARI³

ABSTRACT

Introduction: The World Health Organisation (WHO) recommends an optimal caesarean section rate of no more than 15%. A caesarean audit can identify the changing trends in caesarean section indications and reduce the rates by improving obstetric care.

Aim: To evaluate the impact of a caesarean section audit on the caesarean section rate by comparing pre-audit and post-audit periods.

Materials and Methods: The present retrospective observational study analysed 2698 pregnant women who gave birth between October 2023 and February 2024 at Government Medical College, Tiruppur. Pregnant women who delivered from 1st October 2023 to 31st December 2023 were enrolled as the pre-audit group (n=1698), and those who delivered from 1st January 2024 to 29th February 2024 were enrolled as the post-audit group (n=1000) as we started doing caesarean audit from

1st January 2024. The caesarean section rate was compared between groups by using Robson's 10 group classification system.

Results: The overall caesarean section rate (872 (51.4%) vs 429 (42.9%), p-value <0.001) showed a significant reduction in the post-audit period. The caesarean section rate in group 2a, which represents primary caesarean section {298 (34.2%) vs 98 (22.8%)} was also significantly lower in the post-audit group compared to the pre-audit group. There was one maternal death in the pre-audit group and one in the post-audit group {1(0.0005% vs 1(0.001%) p=1.0}. Neonatal deaths were 10 in the pre-audit period and three in the post-audit period {10(0.005% vs 3 (0.003%) p=0.39}.

Conclusion: Caesarean audit appears to be an effective strategy for reducing the overall caesarean section rate and primary caesarean section rates.

Keywords: Clinical audit, Medical audit, Robson's 10 group classification system, Tertiary care hospital

INTRODUCTION

The WHO recommends an optimal caesarean section rate of no more than 15% [1]. Caesarean section rate is constantly increasing both in developed and in developing countries [2]. Overuse of caesarean section leads to avoidable maternal and neonatal morbidity [3]. The reasons implicated for the rise in caesarean section rate are the increase in maternal age, maternal requests, routine use of electronic foetal monitoring, better anaesthesia, better operative techniques, better neonatal facilities and fears of litigation [4]. A clinical audit can identify the changing trends in caesarean section indications and reduce the rates by improving obstetric care [5-7]. In one meta-analytic study, it was found that by doing a clinical audit, the caesarean section rate can be reduced by 13% [8]. The primary objective of the present study was to compare the caesarean section rate before and after an audit using Robson's 10 Group Classification System. The secondary objectives were to compare the indications for caesarean section and delivery outcomes between the pre-audit and post-audit periods.

MATERIALS AND METHODS

The present retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at Government Medical College Hospital Tiruppur a tertiary care hospital in Tamil Nadu, South India, from 1st October 2023 to 29th February 2024. Prior clearance was obtained from the Institutional Human Ethical Committee (certificate no: 71/86-5451/ME3/2024).

Inclusion and Exclusion criteria: All women who delivered at Government Medical College Hospital, Tiruppur, from 1st October 2023 to 29th February 2024 were included. Abortions and hysterostomies were excluded.

Study Procedure

DATA collection: Delivery records from the labour room register, operation theatre register, and medical records department were reviewed for two defined periods: the pre-audit period {1st October 2023 to 31st December 2023} and the post-audit period {1st January 2024 to 29th February 2024}, as we started doing caesarean audit from 1st January 2024 in the institution. In the pre-audit group, 1698 deliveries and in the post-audit group 1000 deliveries were included.

All caesarean sections were retrospectively classified according to the Robson's 10 group classification system [9] to allow comparisons between both periods. The clinical audit committee in which senior obstetricians were involved, conducted audit of all deliveries in the study period.

STATISTICAL ANALYSIS

Data were analysed using Statistical Package for Social Sciences (SPSS) version 21. Categorical variables were expressed as frequencies and percentages and compared using the Chi-square test. Continuous variables were summarised as mean \pm Standard Deviation (SD) and compared between the pre-audit and post-audit groups using the independent sample t-test. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

The gravida status, residence, gestational age differed significantly between the two groups [Table/Fig-1]. During the pre-audit period, 1698 deliveries were recorded, of which 872 (51.4%) were caesarean sections. In the post-audit period, 1000 deliveries were recorded, with 429 (42.9%) caesarean sections, demonstrating a reduction in the caesarean section rate following implementation of the audit [Table/Fig-2].

Variables	Pre-audit	Post-audit	Total
Maternal age	24.9 ± 4.2	24.5 ± 4.0	0.336#
Gravida status	Primi (806) Multi (892)	Primi (433) Multi (567)	0.036*
Residence	Urban (1599) Rural (48) Migrant (51)	Urban (729) Rural (221) Migrant (50)	< 0.001*
Gestational age	37.74 ± 2.04	37.5 ± 2.21	0.004#
Multiple pregnancies	17	8	0.598*

[Table/Fig-1]: Baseline clinical data pre and post audit groups.

*- Chi-square test, #- independent t-test

Mode of delivery	Pre-audit	Post-audit
Normal vaginal	789 (46.5%)	529 (52.9%)
Vacuum delivery	26 (1.5%)	31 (3.1%)
Forceps delivery	11 (0.6%)	8 (0.8%)
Vaginal birth after caesarean	0 (0.0%)	3 (0.3%)
Lower segment caesarean section	872 (51.4%)	429 (42.9%)
Total	1698 (100.0%)	1000 (100.0%)

[Table/Fig-2]: Comparison of both groups according to mode of delivery.

The group 5.1 (previous caesarean section) was the largest group {520(40%)} followed by group 2a {396(30.4%)}. Significant differences were observed between the pre-audit and post-audit groups, especially for groups 5.1 and 2a [Table/Fig-3].

Robson group	Pre-audit	Post-audit
1	4 (0.5%)	2 (0.5%)
2a	298 (34.2%)	98 (22.8%)
2b	68 (7.8%)	33 (7.7%)
4a	25 (2.9%)	14 (3.3%)
4b	9 (1.0%)	5 (1.2%)
5.1	333 (38.2%)	187 (43.6%)
5.2	10 (1.1%)	8 (1.9%)
6	25 (2.9%)	17 (4.0%)
7	10 (1.1%)	8 (1.9%)
8	14 (1.6%)	6 (1.4%)
9	10 (1.1%)	10 (2.3%)
10	66 (7.6%)	41 (9.6%)
Total	872 (100.0%)	429 (100.0%)

[Table/Fig-3]: Distribution of deliveries according to Robson Ten-Group Classification system in pre-audit and post-audit periods.

Chi-square test, p-value=0.027

Most common indications were previous caesarean section {545 (41.9%)} and presumed foetal distress/Intra Uterine Growth Restriction/abnormal Cardiotocogram {155 (11.9%)}. A reduction in frequency in post-audit group was observed for specific indications, such as Cephalopelvic disproportion and failure to progress [Table/Fig-4].

Delivery outcomes showed that the vast majority of deliveries resulted in live births {2675 (99.1%)}. A small proportion of antepartum stillbirths {20 (0.7%)} and intrapartum stillbirths {3(0.1%)} were observed. No significant difference was found between the pre-audit and post-audit groups (p=0.089), suggesting that the delivery outcomes remained largely unchanged [Table/Fig-5].

There was one maternal death in the pre-audit group. Mother had an abruption intra uterine death, delivered vaginally, underwent peripartum hysterectomy and expired.

There was one maternal death in the post-audit group. This mother underwent caesarean section for antepartum eclampsia. Mother expired due to complication of Antepartum eclampsia. No significant

Indication for caesarean section	Pre-Audit	Post-Audit	Total
Bad obstetric history	1 (0.1%)	5 (1.2%)	6 (0.5%)
Caesarean delivery on maternal request	19 (2.1%)	3 (0.7%)	22 (1.7%)
Compound presentation	0 (0.0%)	2 (0.5%)	2 (0.2%)
Cord prolapse	0 (0.0%)	2 (0.5%)	2 (0.2%)
Cephalopelvic disproportion	100 (11.5%)	34 (7.9%)	134 (10.3%)
Failure to progress (Induction/ in labour)	98 (11.2%)	31 (7.2%)	129 (9.9%)
Fibroid	1 (0.1%)	0 (0.0%)	1 (0.1%)
Intrauterine growth restriction	1 (0.1%)	1 (0.2%)	2 (0.2%)
Long period of infertility	3 (0.3%)	1 (0.2%)	4 (0.3%)
Malpresentation/Unstable lie	9 (1.0%)	6 (1.4%)	15 (1.2%)
Maternal medical disease	3 (0.3%)	2 (0.5%)	5 (0.4%)
Mobile head, gestational diabetes mellitus	0 (0.0%)	1 (0.2%)	1 (0.1%)
Multiple pregnancy	13 (1.5%)	4 (0.9%)	17 (1.3%)
Obstructed labour	1 (0.1%)	0 (0.0%)	1 (0.1%)
Oligohydramnios	95 (10.9%)	31 (7.2%)	126 (9.7%)
Placenta praevia, not actively bleeding	1 (0.1%)	1 (0.2%)	2 (0.2%)
Placental abruption	8 (0.9%)	7 (1.6%)	15 (1.2%)
Patient living with HIV/AIDS	1 (0.1%)	0 (0.0%)	1 (0.1%)
Postdatism	3 (0.3%)	3 (0.7%)	6 (0.5%)
Pre-eclampsia/eclampsia/HELLP	31 (3.6%)	16 (3.7%)	47 (3.6%)
Presumed foetal distress/ intra uterine growth restriction/ abnormal cardiotocogram	97 (11.1%)	58 (13.5%)	155 (11.9%)
Previous caesarean section	349 (40.0%)	196 (45.7%)	545 (41.9%)
Primi, term	2 (0.2%)	0 (0.0%)	2 (0.2%)
Second stage cephalopelvic disproportion	1 (0.1%)	0 (0.0%)	1 (0.1%)
Singleton breech	35 (4.0%)	25 (5.8%)	60 (4.6%)
Total	872 (100%)	429 (100%)	1301 (100%)

[Table/Fig-4]: Indications for caesarean section.

Chi-square test, p-value =0.007

Delivery outcome	Pre-Audit	Post-Audit	p-value
Live birth	1688 (99.4%)	987 (98.7%)	0.089
Antepartum still birth	8 (0.5%)	12 (1.2%)	
Intrapartum still birth	2 (0.1%)	1 (0.1%)	
SNCU admission	76 (4.5%)	34 (3.4%)	0.172

[Table/Fig-5]: Delivery outcomes in pre-audit and post-audit periods.

SNCU-Special newborn care unit

difference in maternal deaths was found between the pre-audit and post-audit groups {1(0.0005%) vs 1(0.001%) p=1.0}. Neonatal deaths were 10 in pre-audit period and three in post-audit period {10(0.005% vs 3 (0.003%) p=0.39}.

The opinion of the person conducting the audit showed that (923)70.9% of cases in both groups agreed that caesarean section was absolutely essential at the time of delivery. The chi-square test revealed a difference between the pre-audit and post-audit groups (p=0.05), indicating that the overall opinion on the necessity of caesarean section increased slightly but the number of caesarean section in which more time could have been given before deciding for caesarean section showed a significant reduction after the audit [Table/Fig-6].

DISCUSSION

A significant reduction in caesarean section rate was observed after implementing caesarean audit at our institution. Caesarean section rate decreased from (872) 51.4% to (429) 42.9%. A study done by

Opinion of Person Conducting Audit	Pre-Audit	Post-Audit	Total
Caesarean section was absolutely essential at that time	604 (69.3%)	319 (74.4%)	923 (70.9%)
More time could have been given before deciding for Caesarean section	268 (30.7%)	110 (25.6%)	378 (29.1%)
Total	872 (100%)	429 (100%)	1301 (100%)

[Table/Fig-6]: Opinion of person conducting audit in pre and post audit groups. Chi-square test, p-value =0.05

Robson MS et al., in 1996 showed reduction in overall caesarean section rate (12% to 9.5%) after implementation of medical audit cycle in labour ward practice [10]. The caesarean section rate of CMH Hyderabad was 41.96% in a study published by Baig JR et al in 2016, which is comparable to the present study which showed a caesarean rate of 42.9% [11]. In a study published by Jacob AT et al., in 2021, the caesarean section rate of Travancore Medical College, Kerala was 45.84% [12] which is slightly more than the current study.

A study done by Pravina P et al., in 2022 found a caesarean section rate of 38.16% at Indira Gandhi Institute of Medical Sciences, Patna, Bihar. In this study, Robson group 5 was the largest contributor accounting for 34.97% of all caesarean sections and group 2 was the second highest contributor at 26.35% [13]. In the present study, the largest contributor was group 5 of all caesarean sections and the second highest contributor was group 2.

A caesarean audit study by Singh S et al., in 2025, at Hind Institute of Medical Sciences atria, Sitapur found that group 5 (24.84%), group 2 (20%) and group 10 (14.54%) were the highest contributors to the overall caesarean section rate with previous caesarean section and foetal distress as primary indications [14].

The current study revealed that caesarean audit significantly reduced the caesarean section rate. Similarly the meta-analysis of Chaillet N and Dumont A revealed that audits and feedback effectively reduced the caesarean section rate [8]. This reduction in caesarean section rate is partly due to Hawthorne effect, which is the human tendency to improve performance because of the awareness of being studied [15]. Scarella A et al., also reported a decrease in the caesarean section rate when audits were implemented [16].

In contrast to the present study, a 2023 study by Abdallah W et al., found that using the Robson's Ten Group Classification System for internal audit and feedback helps analyse caesarean section rates but may not significantly decrease the overall rate [17]. A retrospective pre-post study by Quibel T et al., found that implementing an audit and feedback cycle based on the Robson's Ten Group Classification System did not decrease overall caesarean section rates [18].

The present study provides evidence that audits decrease the caesarean section rate. There was a significant reduction in caesarean section rate in group 2a from 34.2% to 22.8%. It is comparable to study done by Pinto P et al., in which the overall caesarean section rate reduced from 20.27% to 14.82% after establishing internal audit committee and updating management protocols. The greatest reduction occurred in Robson group 2(5.77% to 3.96%) [19].

Peng FS et al., in 2016 reported reduction in overall CSR (34.5% vs 31.1% p=0.008). The most significant decrease occurred in caesarean sections performed for dystocia which fell from 9.6% to 6.2% [20].

In a study done by Dekker L et al., in 2018, the overall caesarean section rate did not significantly changed. The proportion of unjustified caesarean sections fell from 34% to 23% (local auditor assessment) and from 75% to 52% (external auditor assessment) after the audit began [6]. This result is comparable to the current result.

Limitation(s)

Retrospective design, single-centre setting, and reliance on record-based data. Short post audit period may not reflect long-term trends.

CONCLUSION(S)

Caesarean audit appears to be an effective strategy for reducing the overall caesarean section rate and primary caesarean section rate. The authors suggest implementation of caesarean audit in all delivery units.

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