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Determinants and Indications of Caesarean Section Delivery with Associated Complications at the Maternity Ward of Jinja Regional Referral Hospital

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ABSTRACT

Cesarean section (CS) delivery rates have been rising globally, presenting both benefits and risks to maternal and neonatal health. This study aims to explore the determinants, indications, and associated complications of CS deliveries at Jinja Regional Referral Hospital's Maternity Ward. A retrospective analysis of medical records from the hospital's obstetric unit was conducted, spanning three years. Data on demographic characteristics, medical history, indications for CS, and postoperative complications were collected and analyzed using descriptive statistics. The study revealed that the primary indications for CS were cephalopelvic disproportion, fetal distress, and previous CS deliveries. Maternal age, parity, and antenatal care attendance emerged as significant determinants of CS delivery. Moreover, the analysis identified a range of complications associated with CS, including postoperative infections, hemorrhage, and wound complications. These findings underscore the importance of understanding the factors influencing CS delivery and the need for effective management strategies to mitigate associated risks. Enhanced prenatal care, timely interventions, and improved surgical techniques are recommended to optimize maternal and neonatal outcomes in CS deliveries at Jinja Regional Referral Hospital and similar healthcare settings.

Keywords: Casarean Section Delivery; Determinant; Indications; Complications; Jinja Regional Referral Hospital

INTRODUCTION

Caesarean section is defined as an operative procedure whereby the fetus after the end of the 28th week is delivered through an incision on the abdominal and uterine walls[1]. Amidst controversy, it appears that the operation derived its name from notification "lexCesarea"- a Roman law promulgated in 715BC [2]. A cesarean section is a surgical procedure that, when undertaken for medical reasons, can save the life of a woman and her baby[3]. On the contrary, there is evidence that potentially unnecessary cesarean section may put the lives and well–being of a woman and their babies at risk, both in the short and long term[4]. Cesarean sections are also associated with substantial healthcare costs, which can pose a considerable burden on health systems [5]. The cesarean section increases the likelihood of requiring a blood transfusion, the risk of anesthesia complications, organ injury, infection, thromboembolic disease, and neonatal respiratory distress among other short-term complications. Cesarean section may be necessary when vaginal delivery might pose a risk to the mother or baby - for example, due to prolonged labor, fetal distress, or because the baby is presenting in an abnormal position [6] . However, a cesarean section can cause significant complications, disability, or death, particularly in settings that lack the facilities to conduct safe surgeries or treat potential complications [7]. A study carried out in sub–Saharan Africa suggests that identifying common indications for cesarean section and associations with mortality can target improvements in emergency obstetric care [8, 9]. In Uganda, Caesarean section delivery is associated with significant maternal morbidity[10]. Despite the known correlation between determinants and indications of cesarean section delivery with associated complications, a study to identify determinants and indications of cesarean section delivery with associated complications had never been carried out at Jinja Regional Referral Hospital. This study was therefore set to identify determinants and indications of cesarean section delivery with associated complications in the maternity ward of Jinja Regional Referral Hospital in Uganda.

The average cesarean section rate in hospitals in Uganda is 34% for the financial year 2019/2020 (AHSPR 2019/2020) whereas the WHO recommended cesarean section rate among pregnant women is 10-15% [11].In Uganda, research carried out at one of the tertiary referral centers showed that the most common indications for cesarean section were dystocia (44%), presumed fetal distress (18.5%), high-risk uterine rupture (17%), malpresentation (10.5%) and maternal/fetal compromise (10%) [12]. However, Cesarean section may lead to avoidable maternal complications such as infections, hemorrhage, complications related to the use of anesthesia or blood transfusion, and infant morbidity, for example, respiratory problems [12]. Cesarean sections are also associated with substantial healthcare costs, which can pose a considerable burden on healthcare systems ([5, 13]. Despite the known correlation between indications of cesarean section delivery with associated complications, a

study on determinants and indications of cesarean section delivery with associated complications had never been carried out at Jinja Regional Referral Hospital. This study was therefore set to identify determinants and indications of cesarean section delivery with associated complications in the maternity ward of Jinja Regional Referral Hospital in Uganda. Identifying the determinants and indications of cesarean section delivery with associated complications in the maternity ward of Jinja Regional Referral Hospital is the aim of this study.

METHODOLOGY

Study Design

This was a retrospective descriptive cross-sectional study. This study design was used because it helps to describe the post-operative care given to mothers after cesarean section and any records of post cesarean section complications are noted. It allows rapid data collection and avails the opportunity to carry out the study in a specific period thus allowing conclusions about phenomena across a wide population to be drawn.

Area of Study

The study was conducted in the maternity ward of Jinja Regional Referral Hospital, which is located in Jinja City, Jinja district, Eastern Uganda. Jinja Regional Referral Hospital is a referral hospital for Jinja City, Jinja District, Bugiri District, Iganga District, Kaliro District, Kamuli District, Luuka District, Mayuge District, Namayingo District, Kayunga District, and Buikwe District. Jinja Regional Referral Hospital is a public Hospital funded by the Ministry of Health and the general care in the hospital is free. It is one of the 13 regional referral hospitals in Uganda. The hospital is designated as one of the 15 "internship hospitals" where graduates of Ugandan medical schools can serve one year of internship under the supervision of qualified specialists and consultants and senior consultants including obstetrics and gynecology internship rotation. The hospital has a bed capacity of about 600 beds although many more patients are admitted, with many sleeping on the floor.

Study Population

The study population was mothers who had undergone cesarean section for various indications at Jinja Regional Referral Hospital.

Inclusion Criteria

Pregnant women aged 15-45 years who attended Jinja Regional Referral Hospital between the 1st of September 2021 and to 31st of December 2021 for a Caesarean section.

Exclusion Criteria

i. Mothers who had normal delivery were excluded.
ii. Pregnant women who attended Jinja Regional Referral Hospital before the 1st of September 2021 and after the 31st of December 2021 for Caesarean section.
iii. Refusal of consent to participate in the study

Sample Size Determination

The sample was determined using the following formula[14]:

$$n=\frac{z^2 \times p(1-p)}{d^2}$$

$$n=\frac{1.96^2 \times 0.34(1-0.34)}{0.05^2}$$

$$n=\frac{1.92^2 \times 0.34 \times 0.66}{0.0025}$$

$$n=344.8$$

$$n=345.$$

Description:

n = minimum sample size required
z = confidence level at 95% (standard value of 1.96)
p = estimated prevalence of cesarean section at 34% (AHSPR 2020).
d = margin of error at 5% (standard value of 0.05)

Sampling Method

A random sampling procedure was used to choose the patient's records file to be studied. The randomized sample was used with skip interval (k) of 3 and the starting point was randomly selected by lottery method. There was a retrospective study where data was collected using a data collection form. Data was collected using a semi structured data form. Data forms were kept under lock and key by the principal investigator. Double data was done for back up. Data entry was in password protected computer.

Data Analysis

Data was entered in Microsoft excel and exported in STATA version 12. Baseline characteristics were described by using medians, mean, inter-quartile range (IQR) and standard deviation (SD) for continuous variables and percentages for categorical data

Ethical Consideration

i. The guidelines set out by the institution's research committee were adhered to.
ii. The study was carried out only after consent from Jinja regional referral hospital management, to access the patients' records.
iii. Confidentiality of patient's information was strictly adhered to.
iv. Data access was restricted to the research assistant, the principal investigator, and the supervisor.

RESULTS

Socio-demographic Characteristics.

285 questionnaires were used for analysis after questionnaires were checked for completeness. 145 (50.9%) and 140 (40.1%) of the mothers were rural and urban dwellers respectively. The mean age of mothers was 26.8 years with a standard deviation of 5.4 years. Most of the mothers 175 (61.4%) were in the age range of 25-35 years. 214 (75.1%) of the mothers had antenatal follow-up. The majority of the mothers 214 (75.1%) were house wives by occupation. 53 (18.6%) of mothers were operated at a gestational age of <37 weeks. 185(64.9%) were operated within 37-40 weeks (Table 1). The most frequent indication of cesarean section in this study was fetal distress 60 (21.5%) followed by mal position with a total of 50 (17.5%).

Table 1: Socio-demographic characteristics of mothers delivered under cesarean section at Jinja Regional Referral.

Variables	Frequency	Percentage
Age group		
15-19	16	5.6
20-24	73	25.6
25-35	175	61.4
36 and above	21	7.3
Residence		
Rural	145	50.9
urban	140	49.1
Occupation		
House wife	214	75.1
Governmental employee	29	10.2
Merchant	22	7.7
Daily laborer	7	2.5
Student	13	4.6
ANC follow up		
Yes	214	75
No	71	25
Gestational age		
	53	18.6
≤ 37 weeks	185	64.9
37-40 weeks	47	16.5
>40 weeks		
Type of anesthesia		
GA	188	65.9
SA	97	34.1
Type of surgery		
Emergency	262	92
Elective	23	8
Indications for caesarean section		
Failure to progress	30	10
Failed induction	30	10
Oligohydromnious	30	10
Breech	24	8.5
Malposition	50	17.5
CPD	19	6
Fetal distress	60	21.5
Cord prolapsed	10	4.5
Abruption	15	5
Multiple pregnancy	8	2.5
Individual choice	3	1
Others (repeat caesarean section)	6	2.5

Maternal and Neonatal Characteristics and Complications

262(92.0%) of the cases were emergency caesarean sections. 188(65.9%) of the cases were operated under general anesthesia, and the rest 97 (34.1%) were done under spinal anesthesia. Out of 97 patients operated under spinal

anesthesia, 8 (2.8%) patients developed hypotension after spinal block. The number of live births after the cesarean section during the study period was 240 (75%) and the number of deaths after the caesarean section was 45 (25%), thus making the live births to be more than the number of deaths. 13 (4.6%) babies had birth weight of less than or equal to 2.5 kg. Majority 225 (79%) of the babies born after the caesarean section at 1 minute had Apgar score less than 7 and after 5 minutes, majority of babies 240 (84.2%) had APGAR score more than 7. Majority of the babies 203 (71%) had no complications after wards while those with complications 82 (29%) had majorly neonatal sepsis (17.7%). On the other hand, mothers with non-anesthesia complications had postpartum hemorrhage 90 (31%) which was the highest complication. In relation to the type of incision, 50 (17%) of the mothers had other than classical incision and they developed postpartum hemorrhage, which was the highest in that category. In relation to wound infection as a complication, the highest prevalence 19 (6.7%) had a classical incision thus indicating that postpartum hemorrhage is more in other than classical incision and wound infection is more in women with classical incision, however, the majority of women had none of either wound infection or postpartum hemorrhage 165 (57%) with the most of this category having other than the classical incision 95 (33%). Anesthesia related complication only developed in women with spinal anesthesia as they developed hypotension 8 (2.8%) while no maternal complication developed in women who had general anesthesia.

Table 2: Maternal and neonatal out comes and complications at Jinja Regional Referral.

Variables	Number	Percentage
Neonatal live birth after caesarean section	240	75
Number of neonatal deaths after caesarean section	45	25
Number of neonatal live births after caesarean section with complications		
a) Birth asphyxia	82	29
b) Low birth weight (<2.5kg)	10	3.5
c) Neonatal seizures	13	4.6
d) Sepsis	3	1.1
e) others (trauma)	50	17.7
	6	2.1
Number of neonatal live births after caesarean section without	203	71
Maternal outcome		
Postpartum Hemorrhage	90	31
Wound infection	30	10.5
Post-operative blood transfusion	70	24.6
Paralytic ileus	80	28.6
Death	15	5.3
Maternal outcome in relation to the type of incision		
With post-partum hemorrhage		
a) classical	40	14
b) other than classical	50	17
With wound infection	19	6.7
a) Classical	11	3.8
b) other than classical		
without postpartum hemorrhage or wound infection	70	24
a) classical	95	33
b) other than classical		
Maternal outcome related to type of anesthesia		
Under spinal anesthesia		
a) hypotension	8	2.8
b) others	0	0
Under general anesthesia	0	0
a) hypotension	0	0
b) others		

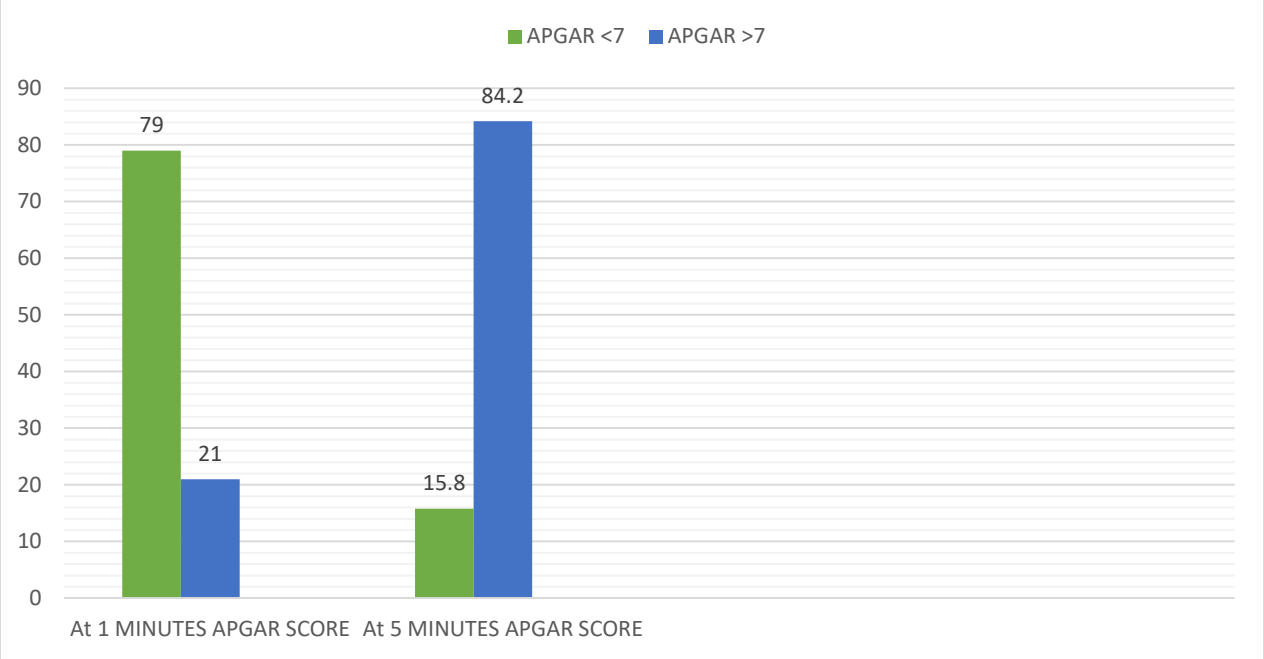

Figure 1: Immediate neonatal complications in relation to APGAR score

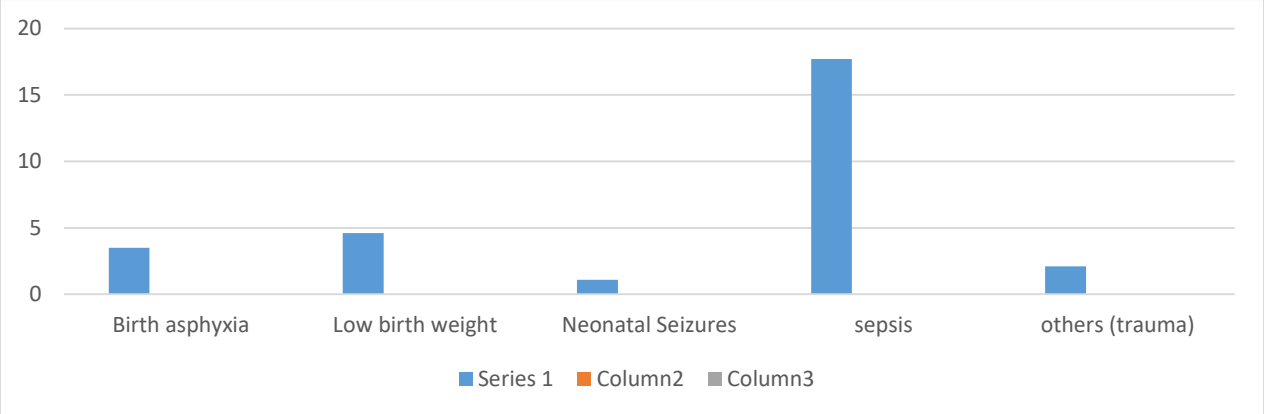

Figure 2: Post immediate Non-Anesthesia Related Neonatal live birth with complications

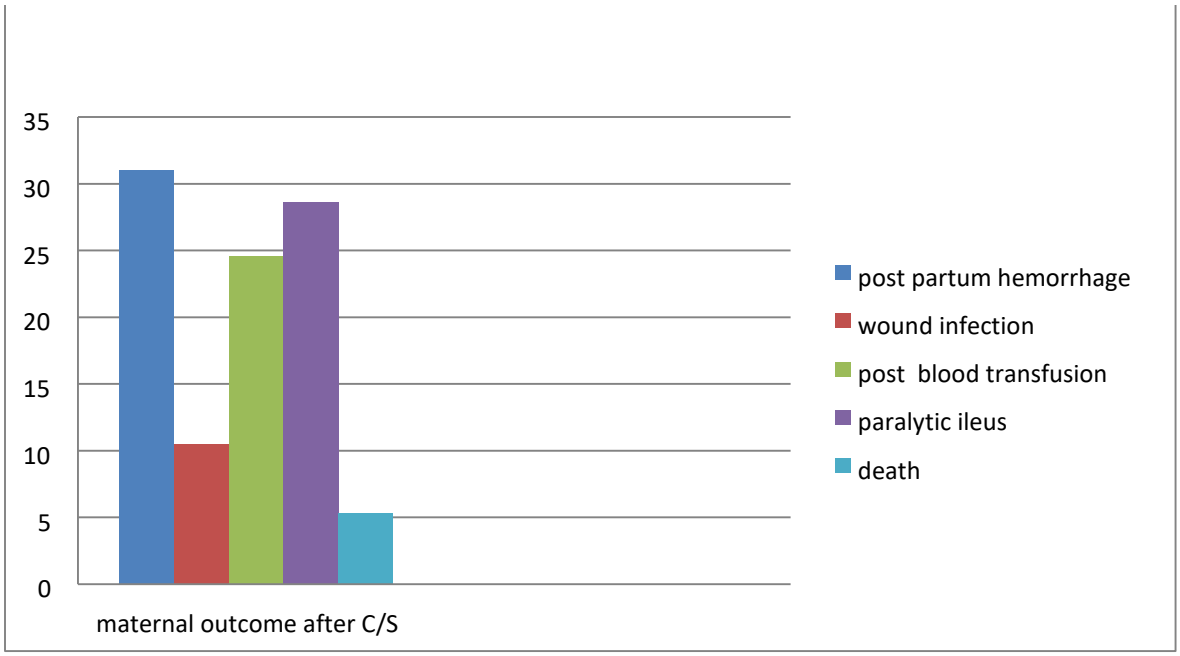

Figure 3: Maternal complicated outcome after cesarean section(C/S)

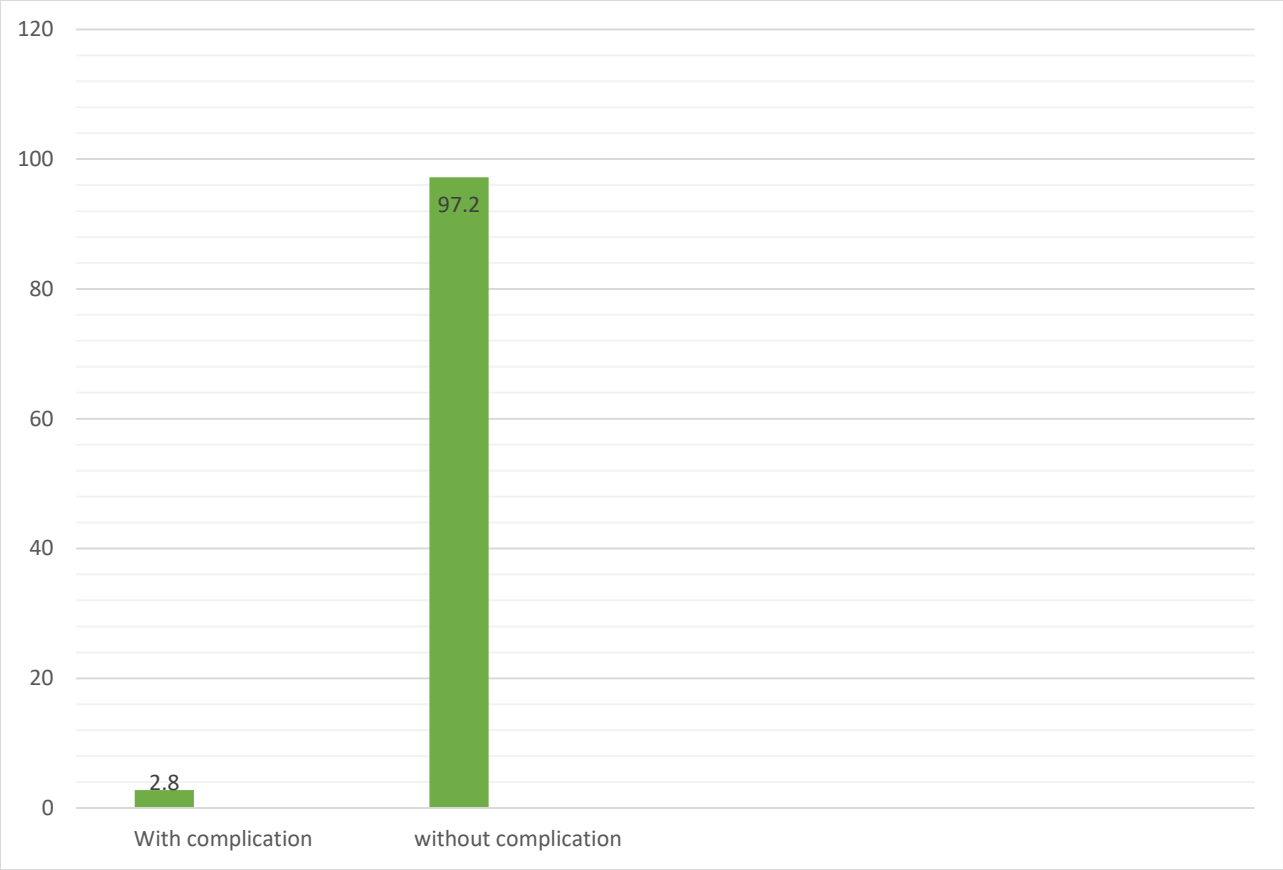

Figure 4: Anesthesia related maternal outcome

DISCUSSION

In this study, mothers from rural setting had a significant percentage of 50.9% undergoing caesarean delivery compared to mothers who were from urban setting. This is attributed to poor health setting in rural areas of eastern Uganda denying these mothers accessibility to proper obstetric and antenatal care assessment as compared to urban areas where there is better health setting with good antenatal and obstetric assessment thus reducing on cesarean section indication at time of delivery. This study showed that 61.4% mothers were in age range of 25-35 years who underwent caesarean section. This is because mothers in the age range of 25-35 years were primigravida with risk of malposition and fetal distress due to failed induction. The study showed that 75.1% were mothers who were housewives by occupation undergoing caesarean section. This is because housewives spend much time at home with little time to do exercises to help on pelvic bones relaxation in preparation for delivery. The study found that 92% of the mothers underwent emergency cesarean section. This is because many of the rural mothers with birth complications first attended to traditional birth attendants and others presented at health centers II and III where resources were limited thus being transferred to Jinja main hospital for further management with requirement of emergency services. Majority of mothers who were operated under general anesthesia had a significant percentage of 65.9%. This is attributed to the fact that many mothers presented with complications and required to be put in relaxed state by using general anesthesia. This study showed that the number of live births after caesarean section was high 240 (75%) compared to number of deaths 45 (25%), but despite the low number of deaths compared with the other adverse outcome, the number was still significant. The prevalence of Low APGAR score less than 7 was 79%, found at the first 1 minute after birth was high in this research, however the APGAR score increased in majority of the babies after 5 minute 240 (85%). This is higher than the review conducted in Uganda teaching hospital from 1998- 2000 which was 28%, [15–18]. The higher incidence of low APGAR score in Jinja Regional Referral could be attributed to pre anesthetic condition as 92% of the cases were emergency C/S, fetal distress being the leading indication. Low APGAR score was associated with type of anesthesia; accordingly, neonates born under general anesthesia showed significant lowering of APGAR less than 5, as compared with neonates born under spinal anesthesia. This finding is consistent with a randomized controlled study conducted in Turkey among mothers that delivered under general anesthesia and spinal anesthesia [19]. This could be explained by the high lipid solubility of drugs used for general anesthesia that readily cross the placenta and depress the neonates more often than local

anesthetic agents used for spinal anesthesia. The use of spinal anesthesia was associated with increased maternal hypotension in this study as compared the use of general anesthesia. This finding is in line with the study conducted in South Korea where mothers operated under general anesthesia developed immediate drop in blood pressure value when compared with mothers operated under general anesthesia [20]. This could be explained by the uterine relaxing effect of halogenated anesthetic agents that could result in increased lowering of blood pressure during use of spinal anesthesia. Low birth weight (birth weight <2.5 kg) was found to be associated with low Apgar score. This is in line with a retrospective study among 601 neonates in Denmark, where neonates with low birth weight had low Apgar score 5, as compared with those with birth weight ≥ 2.5 kg [21]. However, the prevalence of increased neonatal sepsis was found to be the highest amongst all the babies who resulted immediately after birth 50 (17.7%). For the maternal side, the outcome that resulted after the caesarean section in majority of the mothers was post-partum hemorrhage, it ranked the highest as the complication that manifested 90 (31%) this could be due to the invasive nature caesarean section and thus blood vessels are at high chance of being traumatized during the procedure, which was then followed by paralytic ileus with a number of 80 (28.6%) then postpartum blood transfusion which all fall in favor for the postpartum hemorrhage. Amongst those with incision other than classical incision; postpartum hemorrhage was found to be high in this group 50 (17%). The study was limited by the use of data which relied on provider reports. The study did not observe interactions between the types of uterine incision with relation to the outcome of the neonate.

CONCLUSION

The prevalence of a greater number of live births after caesarean section was found to be more than the prevalence of deaths in neonates born after caesarean section. The prevalence of low Apgar score was found to be high in this study especially at 1 minute after birth (79%). Large proportion of newborns delivered under general anesthesia had low Apgar score 107 (37%) than those born under spinal anesthesia. The use of general anesthesia for caesarean section should be minimized and reserved only for those who are contra indicated to spinal anesthesia. Low birth weight was a found to be an associated factor for low Apgar score 5. As for the maternal side, postpartum hemorrhage was found to be the highest complication that resulted in the mothers and in the same category of peoples, postpartum hemorrhage was less in mothers who had underwent classical incision. Wound infection was less in those women whom had undergone incision other than classical (pfnnestrial) on the skin even though wound infection was the second leading complication in mothers whom have underwent caesarean section. Number of Maternal deaths 15 (5.3%) due to caesarean section was found to be low as compared with the other adverse outcomes but however, despite low number, it was still a significant number.

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