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Original Research Article

Magnitude of Maternal Complication and Associated Factors among Mothers Undergone Cesarean Section at Yirgalem General Hospital, SNNPR, Ethiopia

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ABSTRACT

Background: Cesarean section is a major surgical procedure in obstetrics worldwide. It saves the life of the mother as well as the fetus by use of advanced technique, use of antibiotics and blood transfusion. However, its complications during and after cesarean section pose higher maternal morbidity and mortality compared to other modes of deliveries in many developed and developing countries. Maternal complications during and after cesarean sections and associated factors at Yirgalem General Hospital was not studied.
Objective: To assess magnitude of maternal complications and associated factors among mothers undergone cesarean section at Yirgalem General Hospital, Southern Nation Nationalities Peoples Region.
Methods: Institution based cross-sectional study was conducted by reviewing charts of 469 mother who were operated by cesarean section from July 8/2013 to July 7/2015. The sample was estimated based on specified assumptions and by using Epi Info. Data were collected by 2nd year Integrated Emergency Surgical Officers (IESO) from September 1-20/2015.and were analyzed using SPSS version 20.0. Both bivariate and multivariable analysis was carried out to identify factors associated maternal complications.
Results: The overall maternal complication rate was 30.1 % (95%CI 25.9%-34.1%). Living in rural setting (AOR=3.37, 95% CI:1.68,6.77); maternal age 20-34 years (AOR= 3.98, 95% CI:1.64,9.67); mothers referred from other institutions (AOR= 2.23, 95%,CI: 1.37,3.65); multi gravid (AOR= 4.99, 95%CI: 2.75, 9.13); grand multi gravid (AOR= 21.03, 95%CI: 9.30,47.50), have no history of ANC follow up (AOR=3.19,95%CI:1.79,5.65) and operation done with general anesthesia (AOR=2.811,95%CI:1.73,4.57) were found to be significantly associated with maternal complication.
Conclusions: Maternal complication was found to be high. Living in rural setting, maternal age 20-34 years and use of general anesthesia were associated with high maternal complication. Use of appropriate anesthesia will reduce the occurrence of complications.
Keywords: Maternal complication, cesarean section, Yirgalem.

INTRODUCTION

Cesarean section serves as a salvage surgical procedure facilitating rapid delivery of the fetus when prolongation of the pregnancy is deemed undesirable. Cesarean section could be performed as an elective procedure when there is a predictable risk to the mother or fetus during labor or in the presence of an identifiable indication for the procedure. The procedure is however

undertaken as an emergency when a complication of pregnancy or labor warrants quick intervention to deliver the fetus. [1,2]

Cesarean section is the most common major surgical procedure performed in sub-Saharan Africa countries. [3] Over the last decade, there has been a raising rate of cesarean section. This has been a source of major concern to health care providers in many developed and developing countries. The concern stems from the fact that cesarean section is significantly associated with higher risk of maternal morbidity and mortality compared to vaginal delivery. [4]

Aseptic and antiseptic methods with antibiotics therapy, use of blood transfusion and improved anesthesia have all contributed to the dramatic decrease in mortality seen during the last. [5] Despite these improved results, considerable care is still required to maintain and improve the rate of maternal and prenatal morbidity and mortality. The majority of cesarean deliveries are performed for condition that might pose a threat to both the mother and the fetus if vaginal delivery occurred. [6]

Cesarean sections are potentially morbid procedures with overall infectious morbidity rates as high as 25%. [7] In addition to the increased risk for infections with cesarean section, women are exposed to complications such as excessive blood loss and damage to pelvic organs. Future pregnancies may also be affected. There is an increased risk of uterine rupture, placenta accretes, and placenta previa associated with a previous cesarean section. [8] Post-operative complications include endomyometritis, wound infection, fascial dehiscence, urinary tract infections, bowel dysfunction, thromboembolic complications, and pelvic thrombophlebitis. [9]

In many developed countries, women are not allowed to VBAC and must re-sign to a repeat cesarean section with each successive pregnancy, exposing them to greater risks with each procedure and subsequent pregnancy. Aside from the increased delivery costs, future pregnancies are more likely to be complicated because of a primary cesarean section. [10]

July, 2003 American College of Obstetricians and Gynecologist (ACOG) news release reported that cesarean birth significantly increased a woman's risk of a pregnancy related fatality (35.9 deaths per 100,000 deliveries with a live-birth outcome) compared to a woman who delivered vaginally (9.2 deaths per 100,000). [11]

The risk and safety of cesarean section differ from place to place in respect to structural development of health system. Although caesarean section is now safer than it has never been, it can never be entirely safe and therefore, is not an alternate to vaginal delivery. [12]

In Africa, cesarean sections are still performed in harmful conditions for saving the mother and fetus. It has been shown that the risks of surgical complication are greater with emergency compared with elective cesarean section. [13]

In Ethiopia, the overall institutional rate of cesarean section was 18%, which various between 46% in the private for profit sector and 15% in the public sector among this three quarter of cesareans were recorded as an emergency and thus, the magnitude of maternal complication is expected to be high. Prophylaxis antibiotics were given in 94% of reviewed cases; nevertheless, 12% of the cases reported wound infection there were two maternal deaths. [14]

Different studies in Ethiopia indicate that the magnitude of maternal complication following cesarean section were high and associated with various obstetric factors like prolonged or obstructed labor. [15,16] To the level of researcher’s knowledge, maternal complications during and after cesarean section and associated factors at Yirgalem General Hospital (YGH) are not studied. Therefore, this study was carried out to determine maternal complications during and after cesarean section and associated factors as the knowledge of the study results

will help to increase awareness among health care professionals for the prevention of this problem in this hospital.

METHODOLOGY

Study setting

This study was conducted in Yirgalem General Hospital which is found in Yirgalem town, Sidama Zone, Southern Nation Nationalities Peoples Region, Ethiopia. It is located 318 kilometers south of Addis Ababa, capital city of Ethiopia, and 45 Km far from regional city. The Yirgalem General Hospital is serving as a teaching hospital, with a catchment population of more than 4 million. [17] The hospital has seven departments; Obstetrics and Gynecology is one of the Departments where greater than 820 operations are conducted annually.

Study design and Population

Institution based cross-sectional study was employed so as to assess the magnitude of maternal complication and associated factors among mothers undergone cesarean section at Yirgalem General Hospital, SNNPR, Ethiopia, 2015. The maternity records of all patients who delivered by cesarean section in Yirgalem General Hospital from July 8/2013 to July 7/2015 were reviewed. All cesarean sections attended in the hospital from July 8/2013 to July 7/2015 were taken as source and randomly selected charts of mothers undergone cesarean sections July 8/2013 to July 7/2015 in Hospital were considered study population respectively.

Inclusion and Exclusion criteria: All women who had undergone cesarean deliveries during the study period were included where as those with incomplete records, those re-admitted 7days after discharge or those with lost chart were excluded. Stitch abscess and Episiotomy site infection were also excluded.

Sample size calculation

The sample size was computed for magnitude of maternal complication after cesarean section based on the estimation of the proportion of maternal complication in hospital of 20%, [18] an absolute precision of 4% and 5% level of significance.

$$n = \frac{(z_{\alpha/2})2\ p\ (1-p)}{d^2} = (1.96)^2\ 0.2(1-0.2)/\ (0.04)^2 n=384$$

Where n represents sample size, P represents proportion of maternal complication after caesarean section, d, represents margin of error and CI represents confidence interval 95%.

Hence, the initial estimated sample size was 384 Women. Fifteen percent of the sample was added as a contingency considering possible loss due to incompleteness of some cards. Therefore, the total sample size determined was 384 +15%*384 was 442. Sample size for the second objectives was also calculated using maternal age variable greater than 30 and prevalence is 13.0, OR, 2.1, power of test,80% and p-value of 5% the same formula was used and 15% contingency was added the final sample size is 497 It was calculated using Epi-Info

Therefore, by comparing sample size calculated for two objectives that is determining the magnitude of maternal complication among mothers' undergone cesarean section and identifying factors associated with maternal complication among mothers undergone cesarean section at Yirgalem General Hospital, SNNPR, Ethiopia. The largest sample size (n = 432) considering 15% contingency which added to a total of 497 sample size was used for the study.

Sampling technique

The registration numbers of mothers who gave birth by cesarean section from July 8/2013- July 7/2015 were traced from logbooks. The sampling interval or 'k' was calculated by dividing the total number of eligible mothers (1219) to the final sample size (497) and the calculated k -value was approximated and taken as 2. The first chart was randomly selected using lottery method and the subsequent charts were selected by systematic random sampling method using sampling interval of two.

Data collection methods

Data were collected through document review (reviewing mothers' cards and operation records). Two Integrated Emergency Surgical officer (IESO) year II students were initially trained and later collected the data being supervised by the investigator. The structured data abstraction format was pre-tested outside the study area before one week then the main data collection process was commenced.

Variables

Dependent variables

Maternal complications during and after cesarean section in the first week of post-operation.

Independent variables

Age, residence, parity, gestational age, ANC, medical disease, obstetric complications, presentation, indication, prophylaxis antibiotics, qualification of surgeons, type of anesthesia and type of cesarean section.

Operational definitions

Maternal complications: Are complications (with at least one of such complications like Intra-operative or post operative surgical complications, febrile maternal complication, postpartum hemorrhage and venous thromboembolism which occur during and after cesarean section or dead within 7 days of postoperative day's cesarean section).

Intra-operative surgical complications: Include any damage occurring to adjacent organs, including bladder, urinary tract or bowel, as well as unintentional damage to the uterus or cervix.

Febrile maternal complication: Are complications that have a body temperature of greater than or equal to 38^{o}C. Some of the complications are wound infection, endomyometritis, septicemia, puerperal morbidity.

Severe maternal complication: Includes one of the following hemorrhage, blood transfusion, hysterectomy, thromboembolic, and intensive care unit admission, postpartum length of stay, postpartum antibiotics treatment, adjacent internal organ injury, prolonged catheterization, febrile maternal morbidity and death in hospital.

Venous thromboembolic: Formation of a clot of deep veins, usually of the lower limb, with swelling, warmth, and erythema, frequently a precursor of pulmonary embolism.

Postpartum hemorrhage: Is defined as estimated blood loss of >= 1000ml, fall in HCT >10%, post-operation HCT <25%.

Elective cesarean section: Defined as operation that was done at prearranged time during pregnancy to ensure the best quality of obstetrics, anesthesia, neonatal resuscitation and nursing services.

Emergency cesarean section: Defined as operation that was done immediate, unplanned or unscheduled termination of pregnancy via cesarean section for the ultimate purpose of saving the life of both the parturient and her offspring.

Prophylactic antibiotic: Refer to a very brief course of antimicrobial agent initiated just before an operation begins with an attempt to sterilize the tissue, but a critically timed adjunct used to reduce the microbial burden of intra-operative contamination to a level that can not overwhelm host defense.

Data analysis and processing

The data were coded, entered, cleaned and analyzed by using SPSS version 20.0. Descriptive analysis was carried out to explore the socio-demographic characteristics; magnitude of maternal complication after cesarean section was calculated. Bivariate analysis was carried out to examine the relationship between the outcome variable and selected obstetric factors.

Factors for which P-value < 0.25 were retained for subsequent multivariable analysis using multiple logistic regression and those factors which had P-value <0.05 in the final model were taken as statistically significant.

Quality control measures

The data abstraction format was revised for being complete and appropriate before commencement of data collection. Possible corrections were made at every end

of the days to check if there were unnecessary or missing variables.

Ethical considerations

The study protocol was approved and ethically cleared by the Institutional Review Board of Hawassa University, College of Medicine and Health Sciences. Official letter of permission was written to the hospital. Information on the studies was given to the hospital officials and team leaders of the respective departments about the purposes and procedures. In order to protect the confidentiality of the information, name or identification number was not included in data abstraction format. Identification of the client was only possible through numerical codes.

RESULTS

Socio-demographic characteristics of the mothers

During the study period, a total of 4519 deliveries were attended in Yirgalem General Hospital, out of which 1219 (26.9%) women delivered by cesarean section. Out of the 497charts reviewed, 469 (94.3%) were eligible for analysis. The remaining 28 charts (27 with incomplete information and 4 lost charts) were excluded from analysis. Out of the 469 mothers for whom cesarean sections were performed, 146 (31.1%) were from urban and 323(68.9%) were from rural areas. Two hundred fifty four (54.2%) of the mothers were referred from other health facilities and 215(45.8%) were self-referred. The mean (±SD) age of the mothers' was 25.3(±4.8) years and majority of the mothers (78.0%) were in the age group of 20-34 years [table1].

Maternal obstetric and medical history

Three hundred seventy-three (79.5%) mothers visited health facilities for ANC for the recent pregnancy. Most of the women, 222(47.3%) were Para 2 to 5.The leading medical diseases were hypertension, 39(8.3%), HIV/AIDS, 15(3.2%) and diabetes mellitus, 15(3.2). four hindered seven mothers (86.8%) delivered by emergency cesarean section.

Table 1.Socio-demographic characteristics of mothers delivered by cesarean section in Yirgalem General Hospital, July 8/2013 to July 7/2015.

Variables	Frequency (n=469)	Percent (%)
Age		
<20	74	15.8
20-34	366	78.0
>=35	29	6.2
Residence		
Urban	146	31.1
Rural	323	68.9
Referral status		
Referred	254	54.2
Self-referral	215	45.8

Table 2: Obstetric characteristics of mothers delivered by cesarean section at Yirgalem General Hospital, July 8/2013 to July 7/2015.

Variables	Frequency(n =469)	Percent (%)
Parity		
One	201	42.9
Two-five	222	47.3
>Five	46	9.8
ANC follow up		
Yes	373	79.5
No	96	20.5
Medical illness during pregnancy		
Hypertension	39	8.3
HIV/AIDS	15	3.2
Diabetes mellitus	15	3.2
Labor status(n=469)		
Started	395	84.2
Not started	74	15.8
Duration of labor		
<24hr	373	94.4
≥24hr	22	5.6
Status of membrane		
Ruptured	324	69.1
Not ruptured	145	30.9

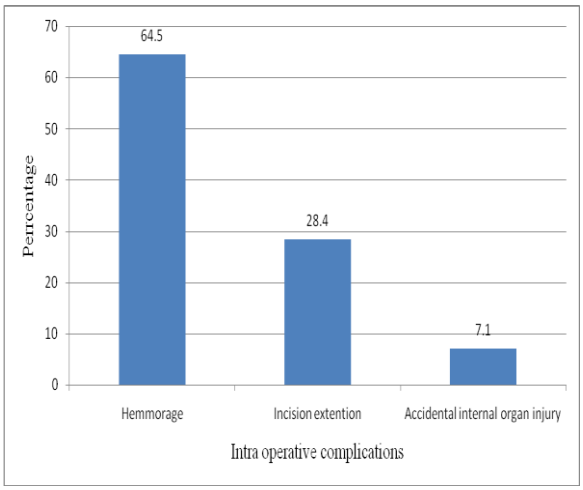

Figure 1, Intra-operative surgical complications of mothers delivered by cesarean section in Yirgalem General Hospital, SNNPR, July 8/2013 to July 7/2015.

MATERNAL COMPLICATION

The overall rate of complications among mothers who delivered by caesarean section were 141(30.1%) with 95% CI (25.9%-34.1%). The leading surgical complications during intra-operative included; hemorrhage, 91(64.5%), incision extension 40(28.4%) (Fig 1). And the major post- operative complications were surgical wound infection 34(43.0%) and febrile morbidity 45(57.0%) details are presented in (Table 3).

Table 3: Post-operative maternal complications of the mothers delivered by cesarean section in Yirgalem General Hospital, SNPPR, July 8/2013 to July 7/2015

Variables	Frequency (n=469)	Percentage (%)
Status of women after operation		
Alive	459	97.8
Dead	4	0.9
Referred	6	1.3
Postoperative maternal complications		
wound infection	34	43.0
Febrile morbidity	45	57.0
Post-operative blood transfused		
Yes	83	17.7
No	386	82.3
Amount of blood transfused (n=32)		
One unit	45	54.2
Two and above	38	45.8
Length of hospital stay after operation		
<5 days	267	57.7
5-7 days	156	33.7
>7 days	40	8.6

Factors associated with maternal Complications

Bivariate analysis showed that there was association between maternal complications and living in rural setting, age group (20- 34 years), referral status, gravidity, had no ANC follow up ,operation done under general anesthesia, duration of operation and emergency cesarean section (Table 4). Those variables which has association at bivariate with maternal complication were undergone multivariable analysis in which living in rural setting (AOR= 3.37, 95%CI: 1.68, 6.77); age group 20- 34 years (AOR=3.98, 95%CI: 1.64, 9.67); referral status (AOR= 2.23, 95% CI: 1.37,3.65); multi gravid (AOR= 4.99, 95% CI: 2.75, 9.13); grand multi gravid (AOR= 21.03, 95%CI: 9.30,47.50); had no ANC follow up (AOR= 2.23, 95%CI: 1.79,5.65) and operation done under general anesthesia (AOR=2.81, 95% CI: 1.73, 4.57) were found to be significantly associated with maternal complications (Table 4).

Table 4: Factors independently associated with maternal complications who delivered by cesarean section in Yirgalem General Hospital, SNNPR, Ethiopia, July 8/2013 to July 7/2015.

Variables(n=469)	Maternal complications Yes No		COR(95%C.I)	AOR(95%C.I)
Residence				
Urban	18	128	1	1
Rural	123	200	4.37(2.54,7.52)*	3.36(1.67,6.77)**
Age				
<20	6	68	1	1
20-34	127	298	6.02(2.54,4.26)*	3.98(1.64,9.67)**
>=35	8	21	4.32(1.35,13.86)*	2.14(0.62,7.34)
Referral status				
Referred	93	161	2.01(1.33,3.03)*	2.23(1.37,3.65**
Self referral	48	167	1	1
Gravidity				
Primigravida	179	22	1	1
Multigravida	118	70	4.83(2.83,8.22)*	4.99(2.75,9.13)**
Grandmultigravid	31	49	12.86(6.84,24.18)*	21.03(9.30,47.0)**
ANC Follow up				
Yes	86	287	1	1
No	55	41	4.48(2.80,7.17)*	3.19(1.79,5.65)**
Types of anesthesia				
Spinal anesthesia	87	270	1	1
General anesthesia	54	58	2.89(1.86,7.50)*	2.81(1.73,4.57)**

*p<0.25 in bivariate, ** p<0.05 multivariable.

DISCUSSION

In this study, the overall maternal complications were 30.1% with 95% CI (25.9%-34.1%).This is high compared to other studies conducted in developing countries. Bamako, Mali Hospital, reported 13.2% [19] and Jimma Hospital, West Ethiopia reported 20%. [16] This variation may be due to the nature of obstetric emergency including accidental internal organ injury and blood transfusion and also the services provided for most referred patients or complicated deliveries yield high maternal complication.

This study revealed that a number of important socio-demographic, obstetric and delivery characteristics were found to have a significant influence on maternal complication of cesarean delivery. These include living in rural setting, age group 20-34 years, referral status, gravidity, those mothers who did not follow ANC for the recent pregnancy and use of general anesthesia during the procedure. These findings are consistent with other studies conducted different countries in Africa. [9,20-23]

The present study showed that mothers in the age group of 20-34 years were four times more likely to develop maternal complications compared with those less than 20 years of age (AOR=3.98, 95% CI: 1.64, 9.67). Contrary to this finding, a report from Bamako G Point Hospital revealed that there is no association in age difference. [19]

In this study, grand multiparty has 21.03 times more risk of developing maternal complications than primgravida (AOR=21.03, 95% CI: 19.30, 47.50). This is consistent with the study done in Sub-Saharan Africa. [21] These complications could be reduced by increasing access to family planning and reducing unmet need for contraception which reduces mortality in this group.

The result of this study further revealed that mothers living in rural settings are 3 times more likely to have risk of maternal complications than those who live in urban areas. Rural women are less likely to utilize a health facility than their urban counterparts and this could reflect that cesarean section facilities are either not available or too far away. Mothers who come from rural setting usually come after prolonged labor which renders the mother for complications.

The present finding showed that referral mothers from other health institutions had 2.23 times higher odds of maternal complication relative to those self referred. The reason for this high maternal complication could be a gap in provision of quality obstetric care during intrapartum period. In addition to this, majority of the mothers came from outside Yirgalem town after they developed obstetrics complications and thus, were subjected to cesarean section.

In this study, mothers who had no ANC follow ups for the most recent pregnancy had 2.23 times more complications compared to those who had attended ANC. This might be due to low health seeking behavior and delay to reach health institutions. Even though more should be done to lower maternal complications by providing better antenatal care services, basic EmOC at the health facility level is critical to achieve safe motherhood.

In this study, it was observed that mothers for whom operations were done under general anesthesia were 2.81 times more likely to have maternal complications compared to mothers for whom operations were done under spinal anesthesia. This finding is in line with a study done in Gondar Teaching Hospital. [22] Another studies conducted in African countries indicated that complicated labor and use of general anesthesia increase the risk of accidental internal organs injury and hemorrhage due to uterine atony. [16,19,20,23,24] These might be due to majority of the cesarean section done after the development of complicated labor, and also majority of the operations performed were on emergency bases either labor started or

complications occurred.

CONCLUSION AND RECOMMENDATION

The magnitude of maternal complication following cesarean section at Yirgalem General Hospital was high. This study identified that living in rural setting, referral status, maternal age and use of general anesthesia as important predictors of maternal complication. Thus, due attention has to be given for closeness of health facilities as international standards, referral status, as well maternal age and the consultation of senior before giving general anesthesia from providers more over clinician must consider these factors in maternal care settings.

Additional points

Cross-sectional study design cannot answer questions involving past events with perfect accuracy. This either magnifies or minimizes the effects of certain variables, affecting the cross-sectional study's results. As the data are taken from secondary source, some of the factors related to maternal complications like body mass index, estimated blood loss, pre-operative and post operative hematocrit or hemoglobin were not found in the medical records if they were included in this study, they may affect the outcome. Since the study is institutional based generalization to the population is not possible.

Authors' contributions

Tsigereda Tesfaye: involved in conception, study design, analysis, interpretation of the results

Dr. Dejene Haile(PhD), Associate professor of public Health: involved in conception, study design, analysis, interpretation of the results

Niguse Mekonnen: Lecturer, design of the study and data analysis, interpreted and wrote the manuscript. All the authors read and approved the final manuscript

Raheal Tesfaye: Lecturer, design of the study and data analysis

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