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Fetomaternal outcomes and Associated Factors Among Second Stage Cesarean Delivery Women Compared to First Stage Cesarean Delivery at Public Hospitals in Bahirdar City, North West Ethiopia, 2022

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**BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND
HEALTH SCIENCE, SCHOOL OF MEDICINE, DEPARTMENT
OF Obstetrics and Gynecology**

**Fetomaternal outcomes and Associated Factors Among Second Stage
Cesarean Delivery Women Compared to First Stage Cesarean Delivery at
Public Hospitals in Bahirdar City, North West Ethiopia, 2022**

By: Abebe Agegn (OBGYN FOURTH YEAR RESIDENT)

**A THESIS REPORT SUBMITTED TO DEPARTMENT OF OBSTETRICS
AND GYNECOLOGY, SCHOOL OF MEDICINE, COLLEGE OF
MEDICINE AND HEALTH SCIENCE, BAHIR DAR UNIVERSITY FOR
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR SPECIALTY
CERTIFICATE IN GYNECOLOGY AND OBSTETRICS**

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BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF MEDICINE

Title	Fetomaternal Outcomes and Associated Factors Among Second Stage Cesarean Delivery Women Compared to First Stage Cesarean Delivery at Public Hospitals in Bahirdar City, North West Ethiopia, 2022: a comparative cross-sectional study
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Duration of study	January to March 2022
Budget	25,000ETB

July 2022
Bahir Dar, Ethiopia

Declaration

This is to certify that the thesis entitled fetomaternal outcomes and associated factors among second stage cesarean delivery women compared to first stage cesarean delivery at public hospitals in Bahir Dar city, North West Ethiopia: A comparative cross-sectional study submitted in partial fulfillment of the requirements for specialty certificate in gynecology and obstetrics Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Name of the candidate

Date

Place

Approval of thesis for defense

I hereby certify that I have supervised, read, and evaluated this thesis titled "Fetomaternal outcomes and associated factors among second stage cesarean delivery women compared to first stage cesarean delivery at public hospitals in Bahir Dar city, North West Ethiopia: A comparative cross-sectional study." by Dr. Abebe Agegn Wudineh prepared under my guidance. I recommend the thesis be submitted for defense.

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Approval of Dissertation for Defense Result

We hereby certify that we have examined this dissertation entitled “fetomaternal outcomes and associated factors among second stage cesarean delivery women compared to first stage cesarean delivery at public hospitals in Bahir Dar city, North West Ethiopia: A comparative cross-sectional study” by Dr. Abebe Agegn Wudineh. We recommend and approve the dissertation a degree of “specialty certificate in Obstetrics and Gynecology”

Board of Examiners

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External examiner’s name	Signature	Date
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Internal examiner’s name	Signature	Date
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Chair person’s name	Signature	Date

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Abstract

Background: Cesarean section significantly reduces maternal and prenatal mortality. The World Health Organization considers Cesarean section rates of 5 to 15% to be the optimal range for targeted provision of these life-saving interventions to mothers and infants. Cesarean Delivery in the second stage of labour in comparison to first stage is associated with a higher risk of complications, including unintentional extension of hysterotomy incisions and increased rates of bladder injury, blood transfusion, injury to the ureters and uterine atony. The risks to the neonate are also increased, with higher rates of admission to neonatal intensive care unit, sepsis. Even though many researchers showed possible maternal and fetal outcomes of second stage Cesarean section abroad, there is limited research done in the country and no study done in the study area. This study is important to assess fetomaternal outcomes and associated factors among second stage caesarean delivery women compared to first stage.

Objective: The aims of this study is to assess the Fetomaternal Outcomes and Associated Factors among Second Stage Cesarean Delivery Women compared to first stage cesarean delivery at Public Hospitals in Bahir Dar City, North West Ethiopia

Methods: A comparative cross-sectional study was conducted from January to March 2022, at public hospitals in Bahir Dar, Amhara Regional state, North West, Ethiopia by comparing 159 second stage group with 493 first stage groups taking 1:3 ratios respectively. The first chart from study populations was randomly selected using lottery method and the subsequent charts were selected by systematic random sampling method using sampling interval. Sample size was allocated proportionally based on cases of each hospital. Checklist was used to retrieve information from the patient medical document. Pretest was conducted on 5% of population. The data was exported to Statistical Package for Social Science version 23 for analysis. Bi-variable and multivariable logistic regression analysis was computed to determine significant association.

Results: Over all maternal complication of second stage group was 50.9% (95%CI=42.9-58.9) compared to 21.7% (95%CI=18.1-25.6) for first stage group. Among mothers who underwent Cesarean Delivery, about 90% were in age group 20-34. The overall neonatal complication of second stage group was 32% compared to 19% for first stage and most common fetal complication was early onset neonatal sepsis (23.2%). Maternal age and indication for surgery were found to be significantly associated with maternal complications.

Conclusion and recommendation: The study revealed higher fetomaternal morbidities in second stage group. Therefore, utmost efforts should be made to avoid surgery. But if compelling situations are encountered due preparations for complication management should be made.

Key words: Fetomaternal Outcomes, Associated Factors, First stage caesarean delivery, Second stage caesarean delivery and Women

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Abbreviations and acronyms

APGAR	Appearance Pulse Grimace Activity and Respiration
CS	Cesarean Section
CD	Cesarean Delivery
CPD	Cephalo pelvic disproportion
FHCSH	Felege Hiwot Compressive Specialized Hospital
IESO	Integrated Emergency surgery and obstetrics
LSCS	Lower Segment Cesarean Section
NICU	Neonatal Intensive Care Unit
NRFHP	Non re-assuring fetal heart rate pattern
PPH	Post-Partum hemorrhage
PLFSOL	Prolonged latent First Stage of labour
SPSS	Statistical Package for Social Science
TGSH	Tibebe Ghion Specialized Hospital
WHO	World Health Organization
Vs	Versus

1 Introduction

1.1 Background

Cesarean Section (CS) is defined as the birth of the fetus through incisions in the abdominal wall and the uterine wall. It is the most commonly performed major abdominal operation in women all over the world. Cesarean can be performed before labour (elective), during first and second stages of labour (emergency)[1].

The rate of CS in the second stage of labour is increasing as a result of reduced rates of attempted instrumental delivery or consideration of operative vaginal delivery[2]. This trend may be related to concerns that maternal–fetal complications are highest when a CS is performed following a failed attempt at instrumental delivery, especially if delivery is indicated because of an abnormal fetal heart rate tracing. Other concerns may be associated with reduced experience or training of the operator, as well as patient preference and patient autonomy[3]

When compared with emergency CS in the first stage of labour, delivery by CS in the second stage of labour is associated with a higher risk of complications, including unintentional extension of hysterotomy incisions and increased rates of bladder injury, blood transfusion, injury to the ureters and uterine atony[4] Caesarean sections in the second stage of labour may have longer operating times (41 minutes vs. 35 minutes); some second stage CS procedures last longer than 90 minutes, especially if there has been a prolonged first stage of labour. In addition, there is some evidence that injury to the cervix during a second stage CS may increase the risk of cervical insufficiency in future pregnancies[5]

The risks to the neonate are also increased, with higher rates of admission to neonatal intensive care unit (NICU), sepsis, cranial injury, need for ventilation, and neonatal death compared to neonates undergoing elective CS or CS in the first stage of labour. The incidence of hypoxic ischemic encephalopathy may be increased in infants delivered by CS in the second stage group compared to first stage. One of the concerns in this context is the danger of excessive force applied, either vaginally or abdominally, to elevate the deeply engaged fetal head[2]

The leading indications for cesarean birth were: Non reassuring fetal heart rate pattern 39 (25%), cephalo-pelvic disproportion (CPD) (17.3%), previous CS 25 (16%), mal-presentation and

position 21 (13.5%), failed induction 11 (7%) and others [antepartum hemorrhage (APH), Premature rupture of membrane and severe preeclampsia] 33 (21.2%) [6]

Therefore, the findings of this study will also be used as additional input for other researchers to conduct further large scale studies on the same problem.

1.2 Statement of the problem

The increasing CS rate is of significant international concern, with reported rates of 25.5 and 32.8% in the UK and USA, respectively[7]. Second-stage CS has been reported as a concerning increasing trend within the increasing CS rate. The rate of CS in the second stage of labour varies from 4.8% of all deliveries by CS to 12 - 29% of emergency Caesarean sections [2].

Evidence suggests that this trend is multifactorial; a combination of lack of training and supervision for junior staff in second-stage decision-making, a loss of technique associated with difficult-assisted delivery and concerns relating to maternal and neonatal morbidity with associated litigious issues[8]. In Ethiopia, the overall institutional rate of cesarean section was 18%, which varies 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 [9].

Caesarean section at full dilatation, with or without attempt at operative vaginal delivery, is a more challenging surgical procedure than a first stage or non-labouring CS and carries a higher rate of maternal morbidity. The morbidity related to a prolonged second stage is directly correlated with the incidence of extension of the uterine angles and prolonged surgical time, bladder injury, and increased incidence of postpartum hemorrhage, pyrexia and length of hospital stay[10].

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) [9].

Neonatal complications following operative delivery in second stage include fetal acidemia, trauma (cephalohaematoma and intracranial haemorrhage; lacerations and facial nerve palsies) and subsequent neonatal intensive care unit (NICU) admissions. The incidence of fetal acidemia is increased in neonates who are delivered by CS after unsuccessful instrumental attempt[11]

Having significant amount of complications following second stage CS, many interventions were made to prevent complications such as operation should be performed or supervised by an experienced obstetric surgeon, digital rotation from occipito posterior position to occipito anterior position, better training in instrumental delivery intrapartum trans labial ultrasonography and alarming the neonatologist beforehand (1,15,18)

Even though many researchers showed possible maternal and fetal outcomes of second stage CS, there is still a gap in studying factors which may affect outcomes regardless of the stage of labour such as pre-existing medical complications and prematurity. Moreover, most studies done locally were in separate group and didn't compare them. Therefore, this study will include the above issues and fills the gap.

1.3 Significance of the study

Despite having high rate of CS and significant number of complications following second stage CS, there is no study conducted in local population and limited study in the country level. This study will help to predict fetomaternal morbidity and mortality so that appropriate precaution can be made before cesarean section. This study will therefore be used as a prediction tool for complication readiness and anticipation of intra operative difficulties.

The findings of this study showed adverse fetomaternal outcomes following second stage CS compared to first stage and forward possible recommendations to decrease these outcomes that will directly benefit patients.

The study may also be used as a base line study for further research to be conducted in the area and country as a whole.

2 Literature review

2.1.1 Magnitude of maternal complications of first and second stage cesarean section

Second-stage CS has been reported as a concerning increasing trend within the increasing CS rate. Recent data suggest that cesarean delivery in labour is associated with increased maternal morbidity compared with cesarean delivery with no labour. One fourth of the primary cesarean section is reported to be performed in the second stage of labour and is more complicated compared to the ones performed in the first stage[11]

The comparative cross sectional study done in Kerela, India shows that most important complication among second stage CS group was post-partum hemorrhage (PPH) (76.7%) and majority of them needed blood transfusion. These complications were less in first stage CS group. Other Complications like increased duration of surgery (mean=53.3 min), post op fever (36%) and Wound infection (13.3%) were seen in second stage group [11].

Another study in India in 2019 shows intra-operative complications were extension of uterine angles 8 cases (16%), atonic PPH 4 cases (8%), bladder injuries 3 cases (6%) and obstetric hysterectomy in 2 cases (4%). Post-operative complications were paralytic ileus 7 cases (14%), febrile illness 7 cases (14%) and wound infection 4 cases (8%) [12].

A five year retrospective review done at Nepal (from 2013 to 2017) shows maternal complications following second stage CD were atonic PPH, uterine incision extension 18 (12.5%), postoperative fever 27(18.8%), wound infection 7 (4.8%) were observed [13].

G. Yildirim and et al in Turkey, (2014) studied a total of 3,817 caesarean deliveries and 3,519 were performed in the first stage, and 298 in the second stage. Caesarean deliveries performed in the second stage were associated with increased intraoperative complications, unintended extensions, need for blood transfusion, higher rates of endometritis and requirement for hysterectomy and were, therefore, associated with longer operation time and hospital stay [14].

Second stage cesarean sections are associated with increased risk of atonic PPH requiring surgical management (7.69%), lower segment tears including angle extension and broad

ligament hematoma(15.38%) along with other complications like extraction difficulty, post-operative fever, wound sepsis, longer duration of hospital stay [1].

Among 4653 deliveries done at Nepal in 2020, a total of 2274(48.88%) were born by caesarean section, out of which 1739 (76.5%) were elective and 535(23.5%) were emergency. Among emergency LSCS 36(6.72%) were performed in the second stage of labor. Most of the indications were non descent of head 34(93.5%) followed by intraoperative maternal complications (hematuria; n=14; 38.88%). Postoperative maternal who had complications were prolong catheterization: 14(38.88%), postoperative fever: 10 (27.77%), prolong hospitalization: 5(13.88%) [15].

A comparative study, which compares fetomaternal outcome of first and second stage CS, done in Nigeria, which includes 347 caesarean deliveries, 245 (70.6%) were performed in the first stage while 102 (29.4%) were performed in the second stage of labour. Women who had caesarean deliveries performed in the second stage were more likely to be referred rather than institutional patients, to have longer operative time, higher blood loss, more cases of intraoperative trauma, primary post-partum hemorrhage, blood transfusion, re-look laparotomy, hysterectomy, post op pyrexia, wound infection and longer hospital stay [16].

Significant difference observed in the mean blood loss between the second stages and first stage C/S, 552 ml vs. 410 ml. Similarly, the women in the second stage C/S had longer mean hospital stay and mean longer operation time than first stage C/S, 5.34 vs. 6.96 days, and 31.12 min vs. 37.5, respectively. Five caesarean hysterectomies were done for postpartum hemorrhage and four cases of extension of incision site were encountered following second stage C/S compared to none in the first stage C/S [17].

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 labour [9]

2.1.2 Determinant factors affecting first and second stage cesarean section outcomes

Comparative cross sectional study done in kerela India shows out of 90 cesarean sections 30 were performed in second stage and 60 in first stage. Seventy four percent were primigravida in

second stage CS group. Arrest due to malposition was major indication for second stage (76% of cases)[11].

Another study done at India in 2019, 1854 CS was done and out of this 50 (2.65%) caesarean was performed in second stage. Non-progress of labour associated with fetal distress was the most common indication for LSCS in second stage of labour accounting for 19 cases (38%) followed by deflexed head 8 cases (16%) and deep transverse arrest 7 cases (14%)[12].

According to a retrospective cohort study done at Australia, 8449/26063 (32.4%) babies were born by caesarean section. Of these surgical births, 476 (5.6%) were performed at full cervical dilatation at >37 weeks' gestation. The majority of women delivered by caesarean section at full dilatation were nulliparous and in spontaneous labour. Consultant obstetricians for public patients were documented as present (either scrubbed or in a supervisory role) in the operating room in only 6.9% of cases overall. This is significantly lower than that reported from groups in the UK [18].

A comparative study on first versus second stage CS done in Ethiopia in 2014 mentioned a total of 3238 deliveries were attended in the three teaching hospitals during the study period making the C/S rate of 30.1%. Three hundred eighty-eight emergency caesarean delivery cases were enrolled using the aforementioned technique with the proportion of 97 (10.9%) second stage and 291 (89.1%) first stage C/S. The most common indications in the first stage were non-reassuring fetal heart rate pattern (NRFHRP) accounting for 110 (37.8%) followed by arrest or protraction disorder of 68 (23.4%), whereas the commonest indication for the second stage C/S was cephalopelvic disproportion 46 (48.5%)[17].

A five retrospective study conducted at Israel in 2018 shows women in the second-stage CS group had a higher nulliparity and hypertensive disorders rates and a lower rate of previous CS. Second-stage CS was associated with more than double the rate of estimated blood loss >1000ml (9.7% v3.8%), and more prone to unintentional uterine incision extension, uterine atony, hemoglobin decrease >2 g/l and antibiotic treatment for suspected endometritis. In a multivariable logistic regression model, second-stage CS was found to be independently associated with unintentional uterine incision extension, uterine atony and antibiotic treatment for suspected endometritis, but not with excessive blood loss. Additionally, failed assisted

vaginal delivery prior to second stage CS was not associated with a higher rate of complications[19].

2.1.3 Magnitude and associated factors of neonatal complications of first and second stage cesarean section

The comparative cross sectional study done in Kerela, India shows higher fetal complications like low APGAR scores were seen in 16.7% of cases in second stage group compared to first stage group and most of them needed resuscitation [11].

Another study in India in 2019 showed there were 22 babies (44%) required NICU admissions, fresh still birth were 5 (10%) and out of the 22 NICU admissions, neonatal death occurred in 9 cases (18%) [12]

A retrospective review done at Nepal (from 2013 to 2017) shows more perinatal complications, meconium stained amniotic fluid 49(34.2%), neonatal hyperbilirubinemia 14(9.7%), increased nursery admission 2(15.3%) and 2(1.3%) perinatal mortality were seen [13].

G. Yildirim and et al in Turkey study indicated neonatal complications included a significantly low APGAR score at 5th minute, increased neonatal death, admission to the neonatal intensive care unit, septicemia and fetal injury following second stage CS [14].

Meconium stained amniotic fluid is present in 30.76% cases. Though timely second stage cesarean sections reduce perinatal mortality few complications like neonatal hyperbilirubinemia occur [1].

A comparative study, which compares fetomaternal outcome of first and second stage CS, done in Nigeria indicated that perinatal complications meconium stain liquor: 10(27.77%), NICU admissions: 5(13.88%), APGAR score <5 at 5 minute, 2(5.54%), fresh stillbirth : 1(2.77%) were common at second stage CS than first stage CS. Infants born to women who had caesarean section in the second stage of labour, had higher incidence of birth asphyxia, admission to neonatal intensive care unit, sepsis, seizure, need for ventilation and neonatal death [16]

Although many efforts were made to study fetomaternal outcomes of second stage CS abroad, results were conflicting and there are limited studies locally. Hence, this study is being done to observe maternal and fetal complications among women undergoing caesarean section during the second stage of labor compared to first stage CS in this study area.

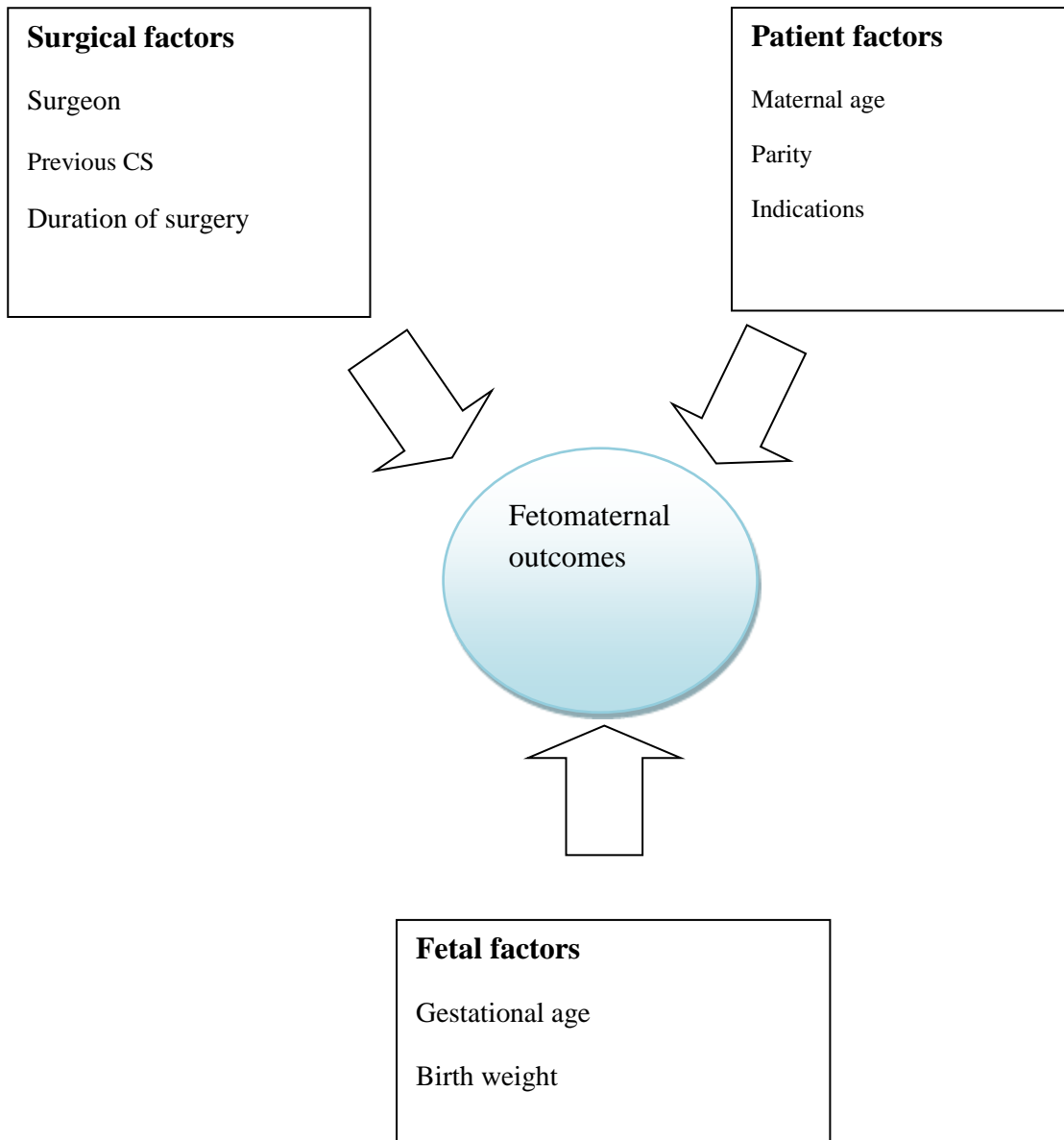


Figure 1: conceptual framework of fetomaternal outcomes and associated factors among first and second stage caesarean delivery women in Bahir Dar city North West Ethiopia: a comparative cross sectional study [1, 9 18].

3 Objectives of the study

3.1 General Objective

To assess fetomaternal outcomes and associated factors among second stage cesarean delivery women at public hospitals in Bahirdar city, from January 2020 to December 2021.

3.2 Specific Objectives

- To determine adverse maternal outcomes among women who gave birth by CD at second stage compared to first stage
- To determine adverse fetal outcomes among women who gave birth by CD at second stage compared to first stage
- To identify factors affecting adverse maternal outcomes among women who gave birth by CD at second stage compared to first stage
- To identify factors affecting adverse fetal outcomes among women who gave birth by CD at second stage compared to first stage

4 Methods& materials

4.1 Study area and period

The study was conducted from January 1 to March 2022 at Tibebe Gion specialized hospital, Felege hiwot comprehensive specialized hospital and Addis Alem primary hospitals in Bahir Dar ,Amhara Regional state ,North West ,Ethiopia.

Bahir Dar is the capital city of Amhara National Regional State, located 565 km Northwest of Addis Ababa with an altitude of 1799 meters above sea level with warm and temperate climate with estimated population of 168,899 as per 2018 world population review. TGSH, FHCRH and Addis Alem hospitals are the three governmental Hospitals in Bahir dar town with estimated catchment population of seven millions and most of their clients are referral cases from health centers and district hospitals.

Tibebe Ghion Specialized Hospital is located about 10 Km south from the Bahir Dar city and about 23 Km from the Blue Nile falls. It is one of specialized hospitals in Amhara regional state and started activity in November 2018 G.C and is working in different departments of which Obstetrics and Gynecology is one. There are five wards and 9 outpatient departments in the department. Under gynecology and obstetrics ward, there are around 60 beds. Regarding to the human power, there are 2 Gynecology oncology Fellows, 18 General obstetrics/Gynecologists, 41 Residents, 27 interns in each group and 73 midwives.

FHCSH has one gynecology ward which has around 30 beds. There are 5 general gynecologists currently working in the department of gynecology and 5 to 10 residents by monthly rotation from TGSH

Addis Alem hospital is the only primary public hospital in Bahir Dar which was established in 2016 GC. Obstetrics and gynaecology is one of the departments in the hospital having about 10 beds. The department gives about 250 labour and delivery service and about 60-70 emergency CD monthly. There is one general obstetrician/gynecologist, two IESO and 17 midwives.

4.2 Study design

Comparative cross sectional study was conducted at public hospitals in Bahir Dar City, North West Ethiopia.

4.3 Source population

All women who gave birth by cesarean section at public hospitals in Bahir Dar City, North West Ethiopia.

4.4 Study population

All women who gave birth by caesarean delivery at first and second stage of labour.

4.5 Inclusion and exclusion criteria

Inclusion criteria

Women who underwent second stage cesarean delivery in the study areas and period

Exclusion criteria

Women with known medical illnesses (such as DM, RVI...) and with gross congenital anomaly, preterm birth, unknown date and cases with missed data on complication variables (estimated blood loss, postoperative hemoglobin) were excluded from the study unit.

4.6 Sample size

A double population proportion sampling technique was used using EPI Info version 7 taking rate of blood loss as main predictor of outcomes based on a study done at Adiss Ababa ,which is having rate of 10.4% among the second stage CS group that had highest sample size and the sample size was calculated with odds ratio of 3,95% level of confidence, power of 80% and the ratio of exposed to unexposed as 1:3 making the sample size for the second stage CS 152 and for the first stage CS 454, total sample size of 606.

With 10% incomplete secondary data = 667. Fifteen charts were found incomplete (8 from second stage and 7 from first stage) making total samples 652.

4.7 Sampling procedure

From the operation room registration logbook all the study populations were listed according to their order by date and time for all hospitals.

The sampling interval ($k=3.2$) was calculated by dividing the total number of second stage group (518) to calculated sample size in this group. The calculated value ($k=3.2$) was approximated to 3. The first chart from second stage group was randomly selected using lottery method and the subsequent charts were selected by systematic random sampling method using sampling interval 3. For every second stage group, the next three first stage group were taken to compare until the desired sample is achieved (167 second stage and 500 first stage) to the final sample size (667)

Sample size was allocated proportionally based on number of cases each hospital performed and sample share of each hospital was 62% for FHCSH, 24% for TGSH and 14% for Addis Alem primary hospital. Therefore, 409 samples were taken from FHCSH, 158 from TGSH and 85 from Addis Alem hospital.

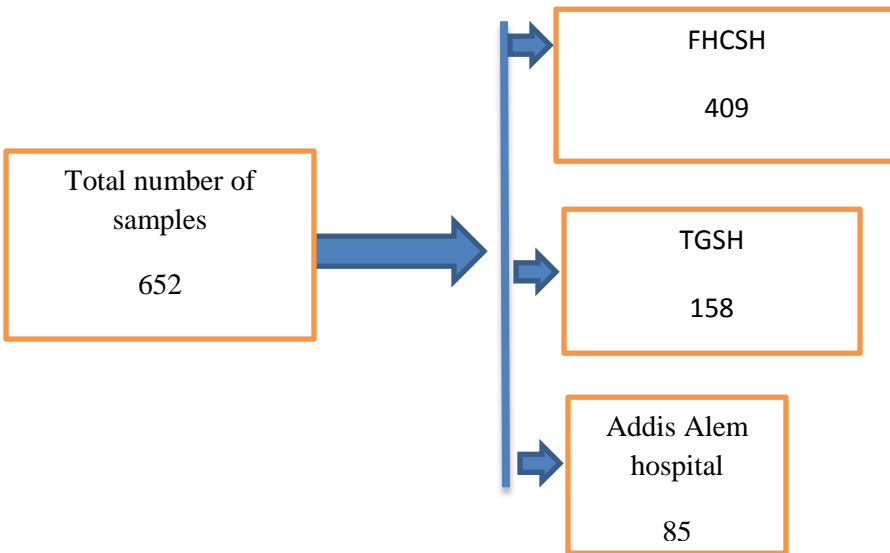


Figure 2: Sample share of each hospital for fetomaternal outcomes and associated factors among first and second stage caesarean delivery women in Bahir Dar city North West Ethiopia

4.8 Study Variables

4.8.1 Dependent variables

Maternal and fetal adverse outcomes of second stage CS

4.8.2 Independent variables

Age, parity, indications, duration of surgery, previous CS, gestational age, birth weight, surgeon

4.9 Operational definitions

Maternal outcome is adverse if one or more of these occurred: extension of uterine angles, PPH, anemia, bladder injuries, obstetric hysterectomy, paralytic ileus, febrile illness, wound infection or maternal death. Outcome is favorable if none of the above occurred.

Perinatal outcome is adverse if one or more of these occurred: perinatal loss, NICU admission, fetal trauma, fetal distress, low 5th minute Apgar score (<7) and Outcome is favorable if none of the above occurred with in first week of life

Cesarean section-is the delivery of a fetus, placenta & membranes through incisions in the abdominal wall (laparotomy) and the uterine wall (hysterotomy) after 37 weeks of gestation and onset of labour.

Second Stage cesarean section: CS done after full cervical dilatation.

First Stage cesarean section: CS done after onset of labour and before full cervical dilatation.

Surgeon: a health profession who performs a caesarean delivery.

Excessive hemorrhage (PPH): Intra operative estimated blood loss more than 1000ml or a drop in post-operative hematocrit of 10 % (16)

Post-operative anemia: Postoperative hemoglobin less than 11 mg/dl for patients who had normal hemoglobin level preoperatively or worsening of mild anemia to moderate anemia or moderate anemia to sever anemia using the WHO calcification for non-pregnant women.

Re laparotomy: Patient who was re-operated before discharge.

Neonatal Admission: neonate admitted to neonatal care unit before the age of seven days.

4.10 Data collection, Processing and analysis

Data collection was done by a well-designed checklist containing the important preoperative, intraoperative and postoperative data. A two year document review (January 2020 – December 2021 G.C) from operation registration books, neonatal admission books and from patient charts was used.

Data were collected by two residents working at obstetrics and gynecology department for FHRH and TGSH and a nurse for Addis Alem hospital after training them and they were supervised. For this one day training was given about the objective of the research, how to use the checklist and how to review the patient chart.

Data were entered and cleaned by using EPI data version 3.1 and analyzed using Statistical Package for Social Science version 23 (SPSS). Descriptive statistics was used to show the prevalence rate of socio-demographic characteristics. For further investigation, Bi variable logistic regression was used to identify the most common associated factors. Those variables with a p value less than 0.25 was taken as candidates for multivariable logistic regression. Ninety five percent confidence interval was computed to assess the presence and degree of association between variables with 5% type I error level. P-value of less than 0.05 denoted significance in differences.

4.11 Data quality control

Prior to data collection, the check list was tested to check the consistency of the checklist format, the ability of the data and collector's performance. The checklist was modified based on the pretest results. One day training how to carry out data collection and quality control was given for the data collectors.

4.12 Ethical consideration

Ethical approval obtained from the institutional review board of college of medicine and health sciences, Bahir Dar University. Permission letter to access charts of patients for retrieving data and to conduct the study was obtained from TGSH, FHCS and Addis Alem hospital office of medical directors and head of department of Obstetrics/Gynecology pediatrics.

Use of the patient chart will not result in any damage or distress; personal identifiers were not included in the check list; confidentiality was maintained when handling each case files; all the information retrieved were kept in the way that will not affect personal privacy. Finally all charts were returned back to their original place.

4.13 Dissemination plan

At the end of the study, Findings of the study will be given to TGSH, FHCRH, Addis Alem hospital and Bahir Dar University College of medicine and health science. It will also be given to Amhara health bureau. Moreover, it will be submitted for scientific publications.

5. Results

5.1 Socio-demographic characteristics of mothers

Among mothers who underwent CS, about 90% were under age group 20-34. The other age groups share about 5% each. Average age was 26yrs with maximum age 45 and minimum 15yrs. (table 1)

Table 1. Socio-demographic characteristics of mothers delivered by second stage cesarean group compared to first stage group at public hospitals Bahir Dar city North West Ethiopia

Age in years	Second stage group		First stage group	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
<20	9	5.6	29	5.9
20-34	134	84.2	445	90.2
>35	16	10	19	3.9
total	159	100	493	100

5.2 Labour and delivery characteristics

In this study, more primiparas were involved about 75%, and those who were having previous CS were only 11 (6.9% of second stage CS), mothers who were admitted in the second stage were having more CD than those who were admitted at latent (table 2)

Table 2. Labour and delivery characteristics of mothers delivered by second stage cesarean group compared to first stage group at public hospitals Bahir Dar city North West Ethiopia

Variables		Second stage group		First stage group	
		Frequency (n=159)	percentage	Frequency (n=493)	percentage
parity	primipara	118	74.2	378	76.6
	Multipara	41	25.8	115	23.4
Gestational age in weeks	37-41	152	95.5	470	95.3
	>=42	7	4.5	23	4.7
Stage of labour at admission	Latent first stage	44	27.6	474	96
	Active first stage	28	17.6	19	4
	Second stage	87	54.8		
Previous CS scar	At least one	11	6.9	69	14
	No scar	148	93.1	424	86

CS: cesarean delivery

5.3 Indications and types of cesarean delivery

Among indications of second stage cesarean, CPD accounts 149/159 (93.7%), the rest being failed vacuum and other indications. NRFHP is most common indication for first stage CS. (Table 3)

Table 3: Indications of cesarean section first and second stage groups at public hospitals Bahir Dar city North West Ethiopia

Indications of CS	First stage group		Second stage group		Total (n)
	Frequency (n=493)	Percentage (%)	Frequency (n=159)	Percentage (%)	
NRFHP	323	65.6	1	0.6	324
PLFSOL + Meconium	83	16.8	0	0	83
PLFSOL + 1 scar	50	10.1	0	0	50
CPD	0	0	149	93.7	149
Failed vacuum	0	0	3	1.9	3
1 scar in labour opted to repeat CS	8	1.6	0	0	8
Others	29	5.9	6	3.8	35

NRFHP: non reassuring fetal heart rate pattern, PLFSOL: prolonged latent first stage of labour, CPD: cephalo pelvic disproportion, CS: cesarean section

5.4 Maternal complications

Overall maternal complication of second stage CS is 50.9% compared to first stage CS 21.7%. Most common one is anemia followed by febrile illness. There were only one bladder injury and two uterine extensions during second stage, but none of them occurred in the first stage CS

Table 4: Maternal complications (one or more) of mothers delivered by second stage cesarean group compared to first stage group at public hospitals Bahir Dar city North West Ethiopia

Intraoperative and postoperative complications	Second stage group		First stage group	
	Frequency (n=159)	Percentage (%)	Frequency (n=493)	Percentage (%)
Anemia	53	33.3	70	14.2
Febrile illness	11	6.9	18	3.7
PPH	8	5	6	1.2
Wound infection	4	2.5	8	1.6
Uterine incision extension	2	1.3	0	0
Bladder injury	1	0.6	0	0
others*	2	1.3	5	1
Total	81	50.9	107	21.7

PPH: post-partum hemorrhage, *re- laparotomy, broad ligament hematoma

5.5 Factors associated with maternal Complications of cesarean section in second stage group compared to first stage group at public hospitals Bahir Dar city North West Ethiopia

Bivariate analysis showed that there was association between maternal complications in the second stage group and maternal age, parity, gestational age and neonatal birth weight (all have p value <0.25) Those variables which has association at bivariate with maternal complication at this group were analyzed for multivariable analysis in which maternal age and neonatal birth weight were found to be significantly associated with maternal complications all having P value less than 0.05.

Maternal age and indications of CS for first stage group had P-value less than 0.25 with bivariate analysis. But only indication had significantly associated with maternal adverse outcome in this group (Table 5)

Table 5: Factors associated with maternal Complications of mothers delivered by second stage cesarean group compared to first stage group at public hospitals Bahir Dar city North West Ethiopia

Variables	Maternal complication for Second stage group (n=159)					Maternal complication for First stage group (n=493)					
	Yes	No	COR	AOR	P-value	Yes	No	COR	AOR	p-value	
Parity	primipara	58	60	0.75(0.37, 1.54)*	0.47(0.18, 1.18)	0.11	82	296			
	Multipara	23	18	1	1		25	90			
Age in years	<20	4	5	1	1		10	19	1	1	
	20-34	72	62	1.10(0.28, 4.31)*	3.44(1.07, 11.005)	.037**	95	350	1.93(.87, 4.30)*	2.21(.97, 5.03)	0.59
	35-49	5	11	2.75(0.50, 14.8)*	1.47(.69, 3.12)	.309	2	17	4.47(.85, 23.36)	5.11(.95, 27.24)	0.56
Previous CS scar	At least one	6	5	1.16(.34, 3.99)*	0.18(.01, 1.88)	0.05	13	56			
	NO scar	75	73	1	1		94	330			
Neonatal birth weight in grams	<2500						11	20			
	2500-3999	76	76	0.40(.07, 2.12)*	1.22(.25, 5.77)	0.79	95	264			
	>3999	5	2	1	1		1	2			
Gestational age in weeks	37-41	8	7	1.02(.98, 1.06)*	1.68(.63, 4.47)	0.29	104	366			
	>41	64	58	1	1		3	20			
indication	NRFHP						59	122	1.76(1.13, 2.72)*	2.61(1.15, 5.93)	0.022**
	Other indication ^						48	264	1	1	

COR: crude odds ratio, AOR: adjusted odds ratio, 1: constant, *p-value <0.25 in bivariant, **P-value < 0.05 during multivariant, others (meconium, scar)

5.6 Neonatal characteristics

The overall neonatal complication following second stage CS was 32% compared with 19% for first stage. The most common fetal complications were early onset neonatal sepsis (EONS) 37/159 (23.2%) and 15.4% for second and first stage respectively. The least one had fresh stillbirth baby from mothers of second stage CS, 3/159 (1.8%) (Table 6)

Table 6: Perinatal outcome among patients undergoing CS in the second stage compared with first stage of labour at public hospitals Bahir Dar city North West Ethiopia

Perinatal outcomes	Second stage CS		First stage CS	
	Frequency (n=159)	Percentage (%)	Frequency (n=493)	Percentage (%)
EONS	37	23.2	76	15.4
Low apgar score	6	3.7	8	1.6
Birth injury	2	1.2	0	0
Perinatal loss	3	1.8	4	0.8
Others	3	1.8	6	1.2
Total	51	32	94	19

EONS: early onset neonatal sepsis

6. Discussion

In this study women who underwent CS at full cervical dilatation had more fetomaternal complications than first stage CS. The overall maternal complication was 50.9% (95%CI=42.9-58.9) among mothers who delivered at second stage compared to those at first stage CS which is 21.7% (95%CI=18.1-25.6). Among these complications anemia (33.3% vs 14.2%), post-operative febrile illnesses (6.9% vs 3.7%) and PPH (5% vs 1.2%) are more common in second stage group compared to first stage group. This finding was higher than study conducted at Yirgalem hospitals in south Ethiopia which was 30.1 % (9), Nepal (14), Israel (1) and lower study done at Kerala, India 76.7% (11). This difference might be due to different study setting and study participants.

This study showed age group which covers about 85% of second stage CS is between 20 to 34 years, which is 3.4 times likely to have adverse maternal outcome than age less than 20 years [AOR=3.44(95%CI: 1.07, 11.05)]. But no significant association observed in the first stage group.

Neonatal sepsis is a serious complication associated with the second stage caesarean section (23.2% vs 15.4%) compared to first stage CS. It may be due to strong uterine contraction or longer duration of caesarean section resulting from deeply engaged head and difficulty in delivery during second stage. Higher rate of Low APGAR score (3.7% vs 1.6%) and perinatal loss (1.8% vs 0.8%) were revealed in second stage compared to first stage group. Similar findings were found by Belay et al (14), study done at Oromia (7), a Tertiary Hospital in Nigeria (19), india Anusha, S., A (11).

The indication, non-reassuring fetal heart rate pattern (NRFHP) was 2.6 times more likely to be the cause of adverse maternal outcome [AOR= 2.6 (95% CI: 1.15,5.93)] compared to other indication in the first stage group.

Despite having clinical association between neonatal complications and stages of labour in both groups, this study showed no significant association between neonatal outcome and any of the factors studied.

Conclusion

The magnitude of fetomaternal complication following caesarean sections done in the second stage of labor was higher compared to first stage CS

Recommendations

Caesarean sections done in the second stage group was undesirable situation associated with maternal and fetal complications. Utmost efforts should be made to avoid surgery. But if compelling situations are encountered, due preparations for complication management should be made

To conduct further study by including other public, private health institutions and by incorporating additional factors.

Limitation of this study

This study had limitations related to lack of important factors such as use of augmentation or induction, antenatal follow up and referral issues which may be associated with fetomaternal outcomes following cesarean section in both groups

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Annex: Check list

Pre-operative Period

- 1. Medical Register Number.....
- 2. Age _____ Parity -----
- 3. Stage of labour at admission diagnosis
 - A. latent stage of labour B. Active stage of labour C. second stage of labour
- 4. Pre-operative hemoglobin (mg/dl) _____
- 5. Previous CS?
 - A. No
 - B. Yes, if yes 1CS, 2CS, more than 2CS

Intra-operative Period

- 6. Surgeon
 - A. obstetrician/gynecologist
 - B. Resident, level of resident
 - C. IESO
 - D. others
- 7. Pre Op diagnosis (indication)-----
- 8. Surgical Approach
 - A. LSTC B. Classical CS C. Cesarean hysterectomy D. others specify-----
- 9. Post Op diagnosis_____
- 10. Duration of surgery in minutes _____

11. Estimated blood loss (in mL) _____

12. Organ injury/intraoperation complication

A. No

B. Uterine extention

C. Urinary bladder

D. Ureter

E. Other _____

Post-operative Period

13. Blood transfusion

A. No

B. Yes, How many unit _____

14. Post Op hemoglobin (mg/dl) _____

15. Circle the letter, if she had a diagnosis and treatment for the following problems

A. No

B. Surgical site infection

C. Urinary tract infection

D. Respiratory tract infection

E. DVT

F. PTE

G. Intestinal obstruction/ paralytic ileus

16. Re laparotomy before discharge

A. No

B. Yes, Indication _____

17. Duration of post-operative hospital stay _____

18. Neonatal

A. birth weight in grams-----

19. Gestational age in weeks

20. Neonatal complications

A. No

B. perinatal loss

C. Sepsis within 7 days

D. Perinatal aspxia

E. Fetal trauma

F. Others specify