COLLEAGE OF MEDICINE AND HEALTH SCIENCE, SCHOOL OF MEDICINE, WOLKITE UNIVERSITY.

PREVALENCE OF POST CAESARIAN SECTION INFECTION AND IT'S ASSOCIATED FACTORS IN WOLKITE UNIVERSITY SPECIALIZED TEACHING HOSPITAL, WOLKITE, ETHIOPIA.

A RESEARH PROPOSAL TO BE SUBMITTED TO SCHOOL OF MEDICINE AS A PARTIAL FULFILLMENT FOR THE REQUIRMENTS OF BACHELOR DEGREE IN MEDICAL DOCTOR.

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Abstract

Introduction: Caesarean section (CS) refers to the delivery of fetus, placenta, and membranes through an abdominal and uterine incision. Post cesarean infection remains the most common complication of CS**.** Infection is one member of the deadly triad of pregnancy related maternal death along with hemorrhage and hypertension and it costs many billions dollars per year.

Objective: the study was aimed to determine the prevalence and associated factors of post c/s infection at WUSH, Gurage Zone, SNNPR, Ethiopia from June 30, 2021 to June 30, 2022.

Methodology: A retrospective cross sectional study design on prevalence of post caesarian section infection and its associated factors was done in wolkite university specialized teaching hospital, Wolkite ,Ethiopia by using structured questionnaires prepared by kobocollect app. The data analyzed using SPSS software version 21 with descriptive statistics and regression

Results: The prevalence of post cesarean section infection was 9.2%. The chance of developing infections for labor more than 24hr before CS (AOR=1.48; 95% CI (0.2, 5.06), pre-op hemoglobin <11g/dl (AOR=2.34; 95% CI (1.01, 5.4), Chorioamnionitis (AOR=5.05; 95% CI (0.4, 7.3), rupture of membrane >12hrs [(AOR =2.57, 95%CI :(0.58, 11.3)], emergency CS (AOR=5.5; 95% CI (0.7, 8.1) were factors associated with post-CS infection.

Conclusion: Post cesarean infection remains a problem of health in our hospital. Infection occurring after delivery may lead to substantial physical and emotional burden to mothers. The development of post cesarean section infection is associated with many factors rather than one factor.

Recommendations: we suggest the appropriate use of partograph for monitoring labor, respect of rules of the prevention of infections during delivery, treatement for anemia during Antenatal care and medical staff responsible for the procedure should be familiar with aspects of the procedure that have been evaluated in good clinical trials to reduce this burden.

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Acromyns

ANC:	**Antenatal Care**
ACOG:	**American College Of Obstetrics And Gynecology**
AOR:	**Adjusted Odd`s Ratio**
APH:	**Antepartum Hemorrhage**
CI:	**Confidence Interval**
CPD:	**Cephalo Pelvic Dispropotion**
CS:	**Caeserian Section**
EDHS:	**Ethiopian Demographic and Health Survey**
GA:	**Gestational Age**
GC:	**Gregorian Calendar**
Gyn/Obs:	**Gynecology And Obstetrics**
ICU:	**Intensive Care Unit**
NRFHRP:	**Non Reassuring Fetal Heart Rate Pattern**
PPH:	**Post Partum Hemmorage**
PROM:	**Prolonged Rupture of Membrane**
SNNPR:	**South Nation Nationality And People Region**
SSI:	**Surgical Site Infection**
UTI:	**Urinary Tract Infection**
WHO:	**World Health Organization**
WUSH:	**Wolkite University Specialized Hospital**
USA:	**United State of America**
UK:	**United Kingdom**

CHAPTER ONE

INTRODUCTION

1.1 Background

Caesarean section (CS) refers to the delivery of fetus, placenta, and membranes through an abdominal and uterine incision. (1). It has been described since ancient times and originally believed to have been derived from the birth of Julius Caesar but it is unlikely that his mother Aurelia, would have survived the operation her son`s invasion of Europe many years later indicates that she survived child birth .The term cesarean may come from caedare , means to cut. Guillimeau introduced the term section instead of the operation, which had been used before. (2) Nowadays it is the most common obstetric surgery. (3)

Cesarean delivery commonly done for the four major indications, namely: cephalopelvic disproportion (CPD) (30%), prior cesarean (30%), Non-reassure fetal heart rate pattern (NRFHRP) (10%) and fetal malpresentations (10%). (2)

While surgery is an essential element in health care, infection and other complications following surgery contribute to maternal morbidity and mortality.(4). The most common cause of postpartum fever is endomyometritis, which occurs after vaginal delivery in about 2% of patients and after CS in about 10% -15%. Postpartum endomyometritis diagnosed with fever of 100.4°F or more with either fundal tenderness or foul-smelling discharge in the absence of any other source. (1)

Surgical site infection (SSI) is another complication (3) and it complicates about 7.8% of cesarean deliveries. (5) It is defined as infection that occurs at or near the incision within the 30 days of the operation or 1 year if foreign body like implant is placed. It is classified as superficial, deep and organ surgical site infection based on the involved tissues or organs. The WHO showed that SSI is frequently reported type of nosocomial infection in both low and middle-income countries. (6) Other causes of puerperal fever include urinary tract infection, breast engorgement, thrombophlebitis, respiratory complications and others. (2)

Prolonged labor, rupture of membranes, Emergent CS, chorioamnionitis and lower socioeconomic status appear to be the factors that most influence the rate of the complications.

(1). Additionally anemia, types of skin incision, thickness of subcutaneous tissue and types of anesthesia are associated with this infection. (3) Other factors associated with an increased infection risk include cesarean delivery for multifetal gestation, young maternal age nulliparity, obesity, and meconium stained amniotic fluid. (2)

Primitive surgical techniques and lack of antisepsis clearly contributed to morbidity. The introduction of penicillin in 1940 dramatically reduced the risk for per partum infections. (2). Single-dose perioperative antimicrobial prophylaxis is recommended for all women undergoing cesarean delivery. (2).

1.1 Statement of the problem

Cesarean section is the second most common surgical procedure (behind male circumcision), accounting for around 20–25% of all deliveries in the UK ,32% in the USA (7), 24.1% in Addis Ababa and 27.6% in Gurage zone, Attat Hospital. (4) (5). The frequency of some maternal complications is increased with all cesarean compared with vaginal deliveries. These are infection, hemorrhage, and thromboembolism, anesthetic complications and others. (8)

Post cesarean infection remains the most common complication of CS in USA. (1). A research conducted in the Tigray Regional State, Ethiopia, 19.3% of women who underwent CS had adverse maternal outcomes. (13). One of the major complications found were wound infection 7%, endometritis 3.6%. (13). According to a research done at southern Ethiopia Gurage zone government hospitals shows infection is most common post-operative complication (25.6%) in mothers delivered in CS followed by the need for blood transfusion 21.6%. (6)

According to American College of Obstetricians and Gynecologist (ACOG) report, Caesarean delivery significantly increased woman's risk vulnerability of pregnancy-related morbidity and mortality which accounts (35.9 deaths per 100,000 live deliveries) as compared to a women possess vaginal delivery (9.2 deaths per 100,000 live births). (9)

In sub-Saharan countries maternal mortality is 3 times higher in CS than vaginal deliveries ranging from 10.1 to 31.9 deaths in 10000 patients and puerperal infection complicates in 25.1%. (10)(11).The maternal death rate in Ethiopia has decreased by half since 2000, although the maternal mortality rate of 412 per 100, 000 live births. (12)

1.3 Significance of the study

Infection is one member of the deadly triad of pregnancy related maternal death along with hemorrhage and hypertension and it costs many billions dollar per year. (7) Surgical site infection is one of the most common postoperative complication which accounts for $3.2 billion in contributable cost per year in hospital which are giving acute care. SSI are the most common reason to be (20%) unplanned admitted after discharging of the patient to their home. (14) And in one study which was conducted in Gurage zone at five hospitals including Wolkite University specialized teaching hospital, post caesarian infection was the first leading poor outcomes of caesarian delivery which accounts for 23.4%. (6)

In our hospital admission following CS due to post CS infection has been routine activities but there is limited scientific evidence on both magnitude of the problem and factors associated with it making prevention mechanism less effective. Post caesarian infection will prolong hospital stay of mother, increase re admission, psychological depression, and increase financial cost.

Therefore the study aimed to identify the prevalence and associated factor of post caesarian infection and the result will be used as input to address and tackle the factor which predispose to infection.

CHAPTER TWO

LITERATURE REVIEW

2.1 Prevalence and Indications

Based on WHO guideline the CS recommended rate was 10% to 15% according to 2015. (15) But in the United States, the cesarean delivery rate rose from 4.5 percent in 1970 to 32.9 percent in 2009. Following this peak, the rate has trended slightly downward and it was 32.0 percent in 2015. More than 85 percent of these operations are performed for four reasons prior cesarean delivery, dystocia, fetal jeopardy, or abnormal fetal presentation. (8)

According to Hospital-Based Analytical Cross-Sectional Study conducted from October 2018-to May 2019 in northern Tanzania; a total of 2310 deliveries occurred during the study period of which 1138 had Caesarean section. The caesarian section rate of 49.1% among those delivered by CS, Out of study participants, 76.2% had an emergency CS delivery and 23.8% elective CS delivery. (16)

According to data From 2000-2019 Demographic And Health Survey there was a significant variation in trend the rate of CS observed in the Urban and rural part of Ethiopia. According to EDHS report, the trend of CS in an urban area over the preceding 5 years of the surveys had increased from the level of 5.1 % in 2000, 9.4% in2005, 8.1 % in 2011, 10.6% in 201 6 and 10.1% in 201 9. Similarly, the trend of CS in rural area had increased from the level of 0.2% in 2000, 0.3% in 2005,0.5% in 2011 , 0.9% in 201 6 and 3.9% in 2019. In all four survey years, the percentage of CS increased among women with overweight (from 7.6% in 2000 to 7.8% in 2016). Women of > 5 parity (from 0.1 % in 2000 to 0.4% in 201 6), a number of ANC visit > 4 from (1 .8% in 2000 to 7.5% in 2016).The rate of CS delivery among women increased age group of 25–34 and 35–49 years of age (0.3% in 2000 to 1.9 in 201 6 and 0.1 in 2000 to 1 .8 in 201 6) survey period, respectively. (17)

The institution based retrospective cross-section study design conducted from April 15 to May 10, 2019, in Butajira General Hospital secondary data from a one year chart review shows the overall prevalence of CS in the study setting was (21%). Among (13.3%) of the mothers had primary CS while (7.7%) had repeat CS. CS was performed for emergency reasons in (13.7%),

whereas elective CS (7.3%) of cases. Among the total study subjects more than half (62.5%) were gravid two and three followed by primigravida (19.4%). Eighty-five percent (212) of study subjects were a term at the time of delivery, (8.9%) preterm and (5.6%) post-term. Only 4(1.6%) of participants had a previous history of stillbirth and (8.5%) had a history of abortion. Nearly all (98.8%) had documented partograph. From those who undergo CS one-third (71.15) of them, the procedure was done due to fetal indication. More than two-thirds (69.7%) of women undergo CS was due to maternal indication and the remaining 30.3% was due to fetal indication. (22)

A 30-day post-CS prospective follow-up through telephone for development of syndromes of SSI in four selected government hospitals in Addis Ababa reveals; the most common indication for CS in the study period was fetal distress 40.4%, followed by CPD 19.9% and arrest of labour 13.3%, while the rest is accountable for other indications such as pregnancy induced hypertension and oligohydramnios. (19)

Institutional based retrospective cross-sectional study which was conducted in Gurage Zone in 5 governmental hospitals from February 21, 2021 to March 13, 2021.The medical records of mothers in the previous two years (February 2019 to January 2021) used. During the 2-year period, 2109 cesarean delivery was performed in these 5 selected hospitals. Malpresentation 25.27%, fetal distress 23.42%, previous CS 23.16%, followed by CPD, 17.66% were the main leading indications for CS. (3)

A hospital-based cross-sectional study conducted from January 01-February 30, 2017 among mothers who delivered at public hospitals in Wolayta Zone shows the prevalence of C/S was 29.8% of women who delivered at public hospitals were by Cesarean section. Emergency CS accounted for 96 % of all CS deliveries. Obstructed labor, antepartum hemorrhage (APH), and twin pregnancy were the main indications of CS. (62.7%) of the study participants were multipara. About (82.7%) of women had planned pregnancy and about three-fourth (75.9%) gave birth at term. (21)

Hospital based cross-sectional retrospective study conducted at Attat hospital from January 2011 – December 2013 GC an incidence of CS was 27.6%. The leading indications for cesarean birth were CPD (38.1%), previous CS (18.9%), fetal distress (12.5%) mal-presentation and malposition, (7.1%), and APH, 6% accounting for 82.6% of the indications for cesarean section. (20)

2.2 Complications and Associated factors

According to Hospital-Based Analytical Cross-Sectional Study conducted from October 2018-to May 2019 in northern Tanzania; a total of 2310 deliveries occurred during the study period of which 1138 had Caesarean section. The complication rate was 27.5%. Among study participants with complications, 14.5% had one complication, 5% had two complications and 8% had three or more. The most common reported complications were puerperal sepsis 4.7%, followed by anesthesia related complications 4.4%, blood transfusion 1.6%, PPH 0.5% and ICU admission 0.5% (16)

A cross-sectional study Felegehiwot referral hospital from October 1, 2016 to September 30, 2017 revealed that the magnitude of post wound infection following CS in this study was 7.8%. Among post wound infection women, 76.7% and 23.3% of them were developing superficial and deep surgical site infection respectively. Regarding the detection time of the surgical site infection, 73.3% of surgical site infection was detected after discharge. Women whose membrane ruptured before CS were 13.9 times more likely risk for surgical site infections than those whose membrane was intact. Women who had a vertical or longitudinal type of abdominal incision were 4.77 more likely risks for surgical site infection than women who had pfennisteil or transverse abdominal incision. The chance of developing surgical site infection among women whose surgery lasting more than 30 min were 4.9 more times than for women whose surgery lasting within 30 min. The odds of surgical site infections were higher among mothers who had interrupted type of skin closure than who had sub cutticular type of skin closure. (18)

A 30-day post-CS prospective follow-up through telephone for development of syndromes of SSI in four selected government hospitals in Addis Ababa reveals; preoperative antibiotics prophylaxis was provided for around 92% of the participants, and among them, 66.3% of the participants gained 2 g ampicillin as a prophylaxis while the rest utilized 1 g ceftriaxone for the same purpose. Most of the health professional's hand washing 70.5% before CS was conducted utilizing plain soap and water, which was available in most setups. Skin preparation for CS of all participants was done by alcohol, while iodine was utilized in addition to alcohol in approximately 20% of the participants. Post-CS antibiotics were provided for 94% of the participants. Two grams of ampicillin IV was used in 70% of those who received the antibiotics.

From 166 participants who completed 30 day follow up, 15% of participants developed SSI. Among them, 68% developed superficial SSI that only required outpatient wound dressing and use of broad-spectrum antibiotics. But 32% developed deep SSI that required prolonged hospital stay. Age, gestational age, and duration of operation showed a significant association with a value of ≤0.05. (19)

Institutional based retrospective cross-sectional study which was conducted in Gurage Zone in 5 governmental hospitals from February 21, 2021 to March 13, 2021.The medical records of mothers in the previous two years (February 2019 to January 2021) used. During the 2-year period, 2109 cesarean delivery was performed in these 5 selected hospitals. Of surgery done 90.22% emergency CS have been performed. Prophylaxis antibiotic has been given in most cases 98.64%. Spinal anesthesia 97% was the most common anesthetic technique, followed by general anesthesia 3%. Eighty-six (n = 368) had at least one intraoperative/postoperative complication from the total maternal records assessed. Out of the 86 mothers, 74 of them 86% have only one type of complication. The remaining mothers 13.9% had 2 or more complications. Among mothers who only have one type of complication, the most common complications observed are; infection 25.6%, need for blood transfusion 21.6%, hemorrhage 13.5% and anesthesia related 12.1%. (3)

Hospital based cross-sectional retrospective study conducted at Attat hospital from January 2011 – December 2013 GC, majority of the patients were between 20-35 years (84%), the rest were younger than 20 age years (9.6%) and older than 35 years (6.4%), (31%) of the mothers were primipara, (63.7%) were between Para one and Para four and (5.3%) were grand multiara, (21%) and (79%) of the women were from urban and rural respectively, The majority of CS were emergencies (90.4%),whereas (9.6%) were elective. All of uterine incisions were lower uterine segment transverse CS. Mothers with ANC follow up have good postoperative outcome than those who didn't have follow up and those mothers whose pre operation hemoglobin ≥ 11 have good post op outcome than mothers with pre operation hemoglobin, <11. (20)

CHAPTER THREE

OBJECTIVES

I. General objective

To determine the prevalence and associated factors of post c/s infection at WUSH, Gurage Zone, SNNPR, Ethiopia from June 30, 2021 to June 30, 2022.

II. Specific objective

- To determine the prevalence of post c/s infection in WUSH.
- To assess the risk factors of post c/s infection in WUSH

CHAPTER FOUR

METHODOLOGY

4.1 Study area and period

4.1.1Study area

The study was conducted in WUSH, Gurage Zone, SNNPR, and Southwestern Ethiopia, which is located 170 km away from the capital Addis Ababa.

WUSH is the only specialized hospital in Gurage zone, which provides services to clients from Gubre town and its surroundings. It has four major departments (Internal Medicine, Surgery, pediatrics and Gyn/obs and four minor departments (Ophthalmology, dermatology, .psychiatry and dentistry). The hospital delivers 24 hours full service of emergency care service in its emergency department.

4.1.2 Study period

The study was conducted from august 12 to September 5, 2022 G.C

4.2 Study design

A retrospective cross sectional study design was employed.

4.3 Population

4.3.1 Source population: all women who gave birth by CS in WUSH from June 30, 2021 to June 30, 2022 G.C.

4.3.2 Study population – 325 randomly selected women who had undergone CS at WUSH from June 30, 2021 to June 30, 2022 G.C.

4.4 Sample size and sampling technique

According to study done in governmental hospital at Gurage zone on 2021 the prevalence of infection was 25.6%, therefore the prevalence (p) 25.6% and a single population proportion will be applied to calculate the sample size.

n= $(Z\alpha/2)^2$ – p(1-p) Where n= required sample size

$Z\alpha/2$ = critical value for normal distribution of 95% confidence interval which is equal to 1.96 (Z value @ 0.05)

P= prevalence from previous study of post cesarean infection =25.6%

d= Tolerable margin sampling error = 0.05%

Hence $n= 1.96^2\ p(1-p/w2\ )$

$$n= \frac{(1.96)^2 \text{ x } 0.256\text{x}0.744}{(0.05)^2} = \frac{0.732}{0.0025} = 293$$

The formula yields n=293

Final sample size = sample size/response rate

= 293/0.9

= 325

We used simple random sampling method to gather data from 481 of total population.

4.5 Variables

4.5.1 Independent:

4.5.1.1 Socio demographic factors: Age, religion, address, literacy status, ethnicity, occupation, marital status, referral status

4.5.1.2 **Obstetrics factors**: parity, gestational age, number of neonates, rupture of membrane, duration of rupture of membrane, intra amniotic infection, duration of labor, onset of labor ,ANC follow up ,Amniotic fluid status, type of CS, anesthesia type, anesthesia duration

4.5.1.3 **Medical factors**: chronic disease, preoperative hemoglobin

4.5.2 Dependent: Post CS infection

4.6 Data collection procedure

Data was collected after reviewing the maternity delivery chart and log book from Operation room and Sample frame was prepared. Then data collected by questionnaires prepared using kobocollect app. The collected data was saved.

4.7 Data quality control

Each day during the data collection to ensure the quality of data we checked formats for their completeness and consistency and the data was sent for our advisor using kobocollect account to check completeness and consistency of the data.

4.8 Data analysis

After data collection was completed, the saved data was exported and the data was imported into SPSS software version 21. We checked for its completeness, cleaned and analyzed accordingly.. Descriptive statistics was computed to determine frequencies and summary statistics (mean, standard deviation, and percentage) to describe the study population in relation to socio-demographic and other relevant variables. We also computed with Regression using Binary Logistic and Multinomial Logistic to establish correlation between dependent variable and independent variable using p value, unadjusted odd`s ratio, adjusted odd`s ratio, and CI. Data presented using tables, graphs and figures.

4.9 Ethical consideration

We obtained official permission from department of obstetrics and gynecology, the person in charge of maternity ward and the record office of WUSH.

4.10 Operational definitions

1. APGAR score – For the neonate(s) is based an appearance, Heart rate (pulse rate) Grimace, Activity (movement) and respiratory rate.
2. GA – is the estimated age of the fetus calculated from the 1st day of LMP or early ultrasound
3. grand multiparty – mother who gave birth for more than 5 children

4. Gravidity – number of pregnancies despite the out come
5. Live birth – birth outcome shows breaths or other evidences of life (e.g Beating of the heart, pulsation of umbilical cord or definite movement of involuntary muscles) whether the cord has been cut or the placenta detached)
6. Parity is a status of having given birth to an infant(s) after completed 28 weeks of GA/ weight greater than 1000 gm irrespective of the out come
7. Puerperium : the period from delivery to 6-12 weeks
8. Prim gravid – fist pregnancy
9. Still birth – Who doesn't show any evidence of life at time of birth

CHAPTER FIVE

RESULTS

Socio demographic Characteristics of women underwent CS at WUSH. Among the total 325 mothers included for the study operated for delivery during the study period in WKU. The mean of the mothers' age is (28.24) the minimum and maximum age in years were 17 and 45 respectively. Majority of mothers age ranged from 26– 30(33.8%) and 103 (31.7%) come from Wolkite.

Majority of mothers were Multipara (76.4%) and (24.6%) were Para 1. Most mothers operated at term pregnancy (69.5%), (85.2%) were emergency cesarean section, 263(80.9%) operation were done with on labor. among mothers who was on labor before operation, 17(5.2%) were stayed more than 24hr. Meanwhile 240 (73.8%) mothers were membrane ruptured prior to CS. All (100%) mothers were taken antibiotics prophylaxis. On post operation hemoglobin determination, 270(83.1%) were greater than eleven and 55(16.9%) were less than equal to eleven. Of 325 studied participant, 46(14.2%) had history of CS and 320(98.5%) were given spinal. The abdominal incision was pfannenstiel (100%).

Table 1: Occupation

Occupation	Frequency	Percent
Government Employed	4	1.2
Housewife	17	5.2
Others	2	0.6
Private Work	4	1.2
Unknown	298	91.7
Total	325	100.0

Table 2: Marital status

Marital status	Frequency	Percent
Divorce	1	0.3
Married	209	64.3
Single	3	0.9
Unknown	112	34.5
Total	325	100.0

Table 3: Educational status

Educational status	Frequency	Percent
Diploma and above	3	0.9
No formal education	2	0.6
Primary School	6	1.8
Secondary School	4	1.2
Unknown	310	95.4
Total	325	100

Table 4: Age of the mothers

Age	Frequency	Percent
15_20	36	11.1
21_25	78	24.0
26_30	110	33.8
31_35	65	20.0

36_40	29	8.9
40_45	7	2.2
Total	325	100.0

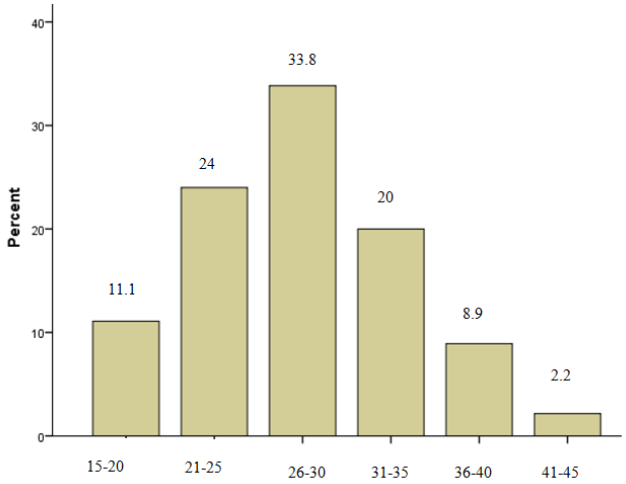

Figure 1 Age of the mothers

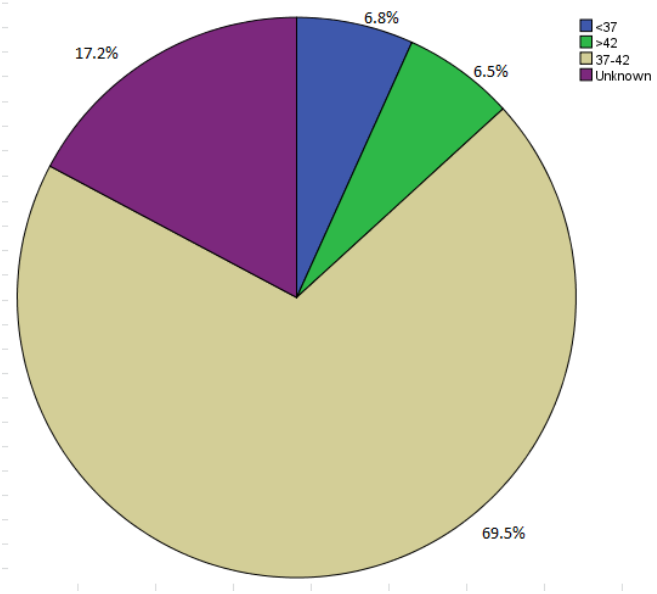

Figure 2 Gestational Age of the mothers

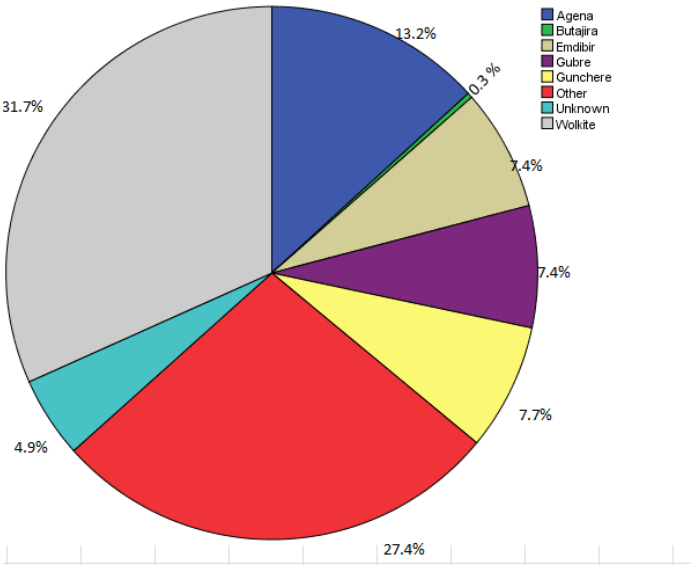

Figure 3: Place of residence

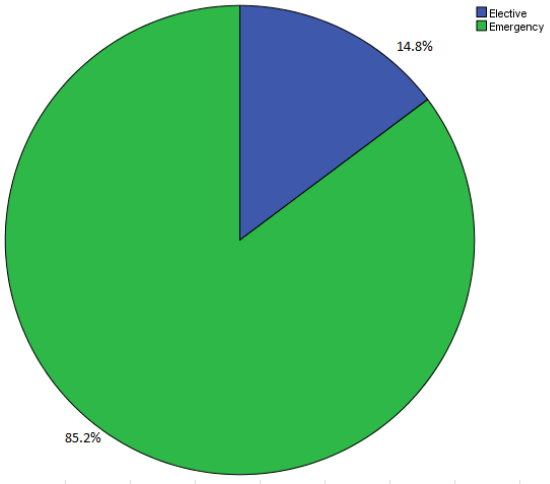

Figure 4: Types of caesarean section

Table 5: Magnitude of post CS infection

Infection	Frequency	Percent
Endometritis	2	0.6
Other	1	0.3
Surgical site infection	10	3.1
UTI	17	5.2
Total	30	9.2

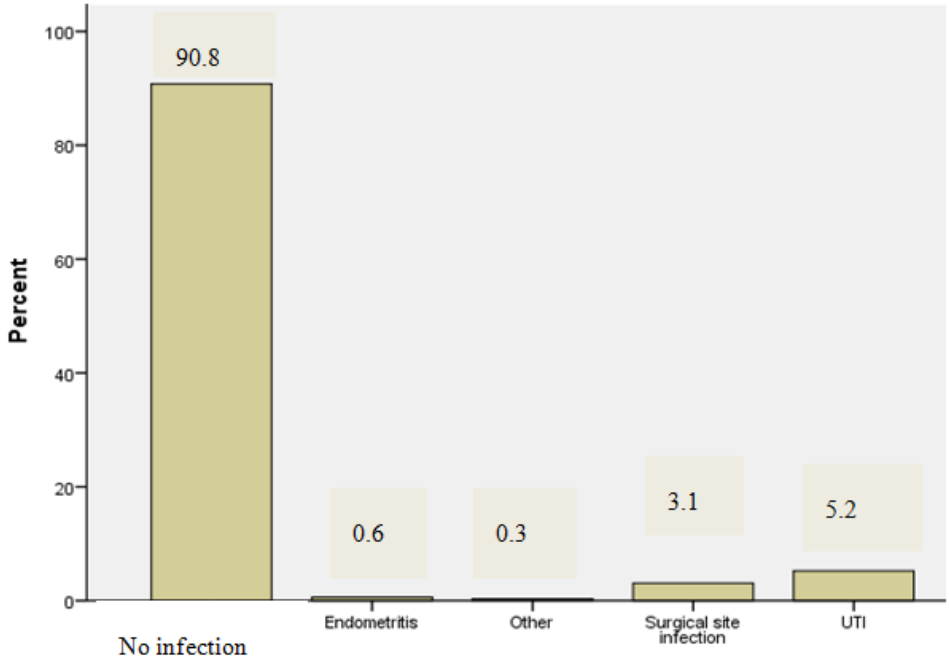

Figure 5: Percentage of Post CS infection

Factors associated with infection following cesarean section

There were five variables in binary logistic regression which had p value of≤ 0.25; and became candidate for multiple logistic regression; duration of rupture membrane before cesarean section, pre-operative hemoglobin, duration of labor before CS, chorioamnionitis and types of CS (emergency or elective). Mothers who were on labor for more than 24h before CS were 1.48

times more likely risk for post CS infections than those less than >24 h (AOR=1.48; 95%Cl (0.2, 5.06). The chance of developing infections for pre-op hemoglobin <11g/dl (AOR=2.34; 95% CI (1.01, 5.4), Chorioamnionitis (AOR=5.05; 95% cl (0.4, 7.3), rupture of membrane >12hrs [(AOR =2.57, 95%CI :(0.58, 11.3)], emergency CS (AOR=5.5; 95% CI (0.7, 8.1) were factors significantly associated with post-CS infection.

CHAPTER SIX

DISCUSSION

The study found that 9.2% of mothers who had CS developed infection. The finding of this study was lower in prevalence compared to study done public hospital in Gurage zone 25.6% (6). The reason might be use of prophylactic antibiotic 100% as compared to 98.64% and our study was done only in specialized hospital where there is better nursing care and facility as compared to previous study which is done in all public Hospitals including primary Hospitals. It is also lower than study done Denmark (18%)] (8). The reason might be due to our study having been underestimated as the study was exclusively based on medical records review, and it did not involve post- discharge follow-up.

This finding is approximately in line with the study done in England (9.6%) (9). This is due to those studies were conducted institutional based, comparable sample size as well as prophylactic antibiotic is given for almost all of the mothers.

The finding of this study was greater as compared to study done at Mali at which frequency of post CS infection fluctuates from 1.5%(2010) to 2.1%(2015). The variation could be justified by lack of adequate infection control, lack of adequate postoperative care, inadequate infection control, lack of up to date knowledge and insufficient professionals in Ethiopia. Though the Federal Ministry of Health Ethiopia developed standard National Guideline on infection prevention; study support the health care workers had insufficient knowledge and perception on universal precaution (10).

In our study the rate of post CS; UTI is 5.2% which is the most common among infections. The finding of this study was greater as compared to study done in France, where the rate of post cesarean UTI was 1.8% (11), Denmark (4.6%) (12), some European studies (3%) (13). This is likely due to differences in infection definition, surveillance, diagnosis, and healthcare practices. Study done in Mbarara regional referral hospital in Uganda shows the rate of post CS is 14% (13). This is greater than our result, this might be due this is study is prospective cohort as compared to our study which undermine post discharge follow up and urine analysis was also done for those who have no urinary symptoms in contrast to our study.

In our study 0.6% patients were found to have postpartum endometritis. We were unable to compare it with locally due to lack of the same study. But low compared with study done at Harbor University of California at Los Angeles Medical center (27%) (14). But this study is prospectively done who had CS without prophylactic antibiotic. Also this result is low as compared in with study done at Ukraine where the rate was 16.4% after cesarean delivery (15).This might be due to large sample size as compared to ours; as that study was done at 14 large Women's Hospital in 2 year duration.

And the rate of post SSI in our study is 3.1%, this study approximately similar to others study done Oman, Saudi Arabia (2.6%); at UAE which is 2.5% (16). This finding was lower than that found in Jimma Referral hospital 11.4%; however included all obstetrical procedures (CS, and abdominal hysterectomies, destructive vaginal deliveries) unlike this study was focus on CS (17). This finding much lower than finding on Zimbabwe which was (29%). This difference might be it was cohort prospective study and was done in two big referral teaching hospitals in the countries where as this research was done one hospital. Overcrowding in the wards is a precursor of infection (18). On the other hand this prevalence is higher than research done in Guangdong, China (0.7%); the possible reason may be; be due in the study area (China) it was account for almost 70% of births in some urban areas but in our country majority were rural areas (low socio economic status) (19) .

Women who had duration of labor greater than 24 hrs prior to CS were 1.48 times more likely to have infection than those who were not in labor, which was similar to findings done in Nigeria and Hawassa; Ethiopia. (20) (21) The possible explanation could be that as the duration of labor increases, the frequency of vaginal examinations also increases, which leads to ascending infections that might induce post-operative infection. (22) (21)

Women who had premature rupture of membrane greater than 12hrs were 2.57 times more likely to develop post-CS infection than those who were not. This finding was consistent with the study conducted in Nigeria and Addis Ababa; Ethiopia (20) (22). Normally during pregnancy, cervical mucus plugs, fetal membranes and the amniotic fluid all serve as barriers to infection. However, when the membrane is ruptured, this protective effect is gradually reduced over time as amniotic fluid becomes no longer sterile. This finding was also in line with other cross-sectional studies conducted in Ethiopia at Mizan Tepi(12.9%); Jimma (11.4%) and Hawassa Ethiopia(11%) (23)

(24) (21). This might be due to similar means of data collection (retrospective chart review), post-cesarean infection definition, and similar health care delivery system.

In current study, women with chorioamnionitis were 5.05 times more likely to develop infection when compared to those who had no chorioamnionitis. Similar findings have been reported in Ethiopia meta-analysis, sub-Saharan African countries, India and United States of America (3) (25) (26). This is due to unsterile membrane including the fluids which contain infection causing microorganism will have an access to other organs and tissues during CS that can be potential source of infection after cesarean section.

The present study showed those with hemoglobin less than 11g/dl have 2.3 times increased risk of post CS Infection. This study is similar to the study done in Scotland (27) and Nigeria (28). The possible explanation could be anemic mothers lack natural tolerance for infection and this might leads to sepsis. Ethiopia is one of the countries which have poor socio-economic status; due to this pregnant and post-partum mothers face a lack of balanced diet to challenge anemia and its associated complications like sepsis.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATION

7.1 Conclusion

Cesarean delivery is one of the most frequent surgical interventions performed worldwide and accounts up to 60% of deliveries in a number of countries (29) (30). It carries risk for varies short term morbidities including infection. Infection occurring after delivery may lead to substantial physical and emotional burdens on the mother and to a significant financial burden on the health care system (31). Post cesarean infection remains a problem of health in our hospital. The risks factors of these complications are reported in this survey such as context of cesarean section, prolonged labor, PROM, preoperative anemia and chorioamnionitis. UTI and surgical site infections were the main infectious complications after cesarean in our service.

7.2 Recommendations

Given its substantial implications, recognizing the consequences and building strategies to prevent and treat post CS infection are essential for reducing post cesarean maternal morbidity and mortality. A best practice of the management of the patients who have undergone cesarean should permit to avoid this deadly complication. Recognizing risk factors particularly modifiable ones that may be related to the woman, pregnancy or to the technique itself and implementing strategies to prevent, diagnose, and treat infection in time are all vital steps for reducing the occurrence of post cesarean infection and consequences.

Our study suggests the appropriate use of partograph for monitoring labor, respect of rules of the prevention of infections during delivery, treatment for anemia during ANC and medical staff responsible for the procedure should be familiar with aspects of the procedure that have been evaluated in good clinical trials to reduce this burden.

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Appendix

Questionnaires

Questionnaires prepared by kobocollect app which is available on play store with site ` kobotoolbox.org` and it incorporates the following parameters.

1. MRN
2. Age
3. Marital status: A/ single B/ married C/ divorce D/ widowed E/ Other F/ Unknown
4. Place of residence: A/ Gubre B/ Wolkite C/ Endibir D/ Agena E/ Butajira F/Gunchere F/Other G/ Unknown
5. Occupation: A/ Government employed B/ Private work C/ House wife D/ Unemployed E/ Others F/ Unknown
6. Educational status A/ No formal Education B/ Primary school C/ Secondary school D/ Diploma and above E/ Unknown
7. Maternal medical illness during current pregnancy A/ Yes B/ No
8. If yes for the above A/ DM B/ Hypertension C/ Heart failure D/ HIV/AIDS E/ Renal disease F/ TB G/ Other
9. If other specify
10. Referral status A/ Yes B/ No
11. Parity A/ 1 B/2 C/3 D/ 4 E/ >=5
12. GA A/ <37 B/ 37-42 C/ >42 D/ Unknown
13. ANC follow up A/ Yes B/ No
14. If yes , How many times A/ One times B/ Two times C/ Three times D/ Four and above
15. Gestation A/ Singleton B/ Twin C/ Others
16. Obstetric complication during current pregnancy A/ Yes B/ No
17. If yes A/ APH B/ PROM C/ Chorioamnionitis D/ Preeclampsia/eclampsia E/ Obstructed labor F/ Malpresentation G/ Suspected uterine rupture H/ Other
18. If other specify
19. Was the Labor started A/ Yes B/ No
20. If yes, how long had it been in hours?

21. Was the membrane ruptured? A/ Yes B/ No
22. If yes, how long had it been in hours?
23. Amniotic fluid status A/ Clear B/ Meconium stained amniotic fluid D/ blood stained amniotic fluid E/ Unknown
24. Cervical status A/ closed B/ < 4cm C/ 4-9cm D/ 10cm
25. Station A/ High (-1 and above) B/ Zero C/ Low (+1 and below)
26. Preoperative hemoglobin
27. Prophylaxis antibiotics A/ Yes B/ No
28. Type of cesarean section A/ Emergency B/ Elective
29. Indication for surgery A/ CPD B/ Obstructed labor C/ Fetal Distress D/Cord prolapse E/Maternal preference F/ Twin 1st fetus non vertex G/ Malpresentation H/ Previous two or more I/ Other
30. If other specify
31. characteristics of CS A/ Primary B/ Previous one C/ Previous two more CS
32. Anesthesia type A/ spinal anesthesia B/ General anesthesia C/ Local anesthesia
33. Type of uterine incision A/Lower uterine transverse B/ Inverted T C/ Classical D/ J-shaped
34. Anesthesia starting time
35. Anesthesia ending time
36. Maternal status A/ Alive B/ Dead
37. Intra operative/ post-operative complications A/ Yes B/ No
38. If yes, what type of complication was observed? A/ Hemorrhage B/ Infection C/ Blood transfusion D/ Internal organ injury E/ Anesthetic complication F/ Drop in Hct/ Hgb G/ Reoperation H/perpartum hysterectomy I/ Admission to ICU J/ Thromboembolic event K/Amniotic fluid embolism L/ Other
39. If other , specify
40. If infection mention type of maternal post CS infection A/SSI / Endometritis C/ UTI D/ Other
41. If other ,specify
42. Sex of the new born A/ male B female
43. Survival status of the new born A/ Alive B/ Dead

44. One minute APGAR score A/< 4 B/ 4-6 C/ 7-10
45. Five minute APGAR score A/< 4 B/ 4-6 C/ 7-10
46. Fetal weight A/ < 1000gm B/ 1000gm-1499gm C/ 1500-2499gm D/ 2500-3999gm E/ >4000 gm
47. Admission to ICU A/ yes B/ No
48. If yes, reason for admission
49. Does the new born referred to other facility for further treatment A/ yes B/ No