POST-CAESAREAN SECTION COMPLICATIONS AT THE UNIVERSITY TEACHING HOSPITAL, LUSAKA

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Marie Jeanne Mukeshimana
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2007

DECLARATION

I hereby declare that this dissertation represents my own work, it has not previously been submitted for a degree, diploma or any other qualification at this or any other University.

Signed……..

Candidate: Dr. Marie Jeanne

Signed……..

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Supervisor: Dr. Maureen Chisembele

Signed……

Co-supervisor: Dr. C.M. Kaseba

SUPERVISOR'S CERTIFICATE

The dissertation of Dr. Marie Jeanne Mukeshimana is ready for examination

Signed (Supervisor): .....

Signature

Dr. Maureen Chisembele
Lecturer
School of Medicine
University of Zambia

Signed (co-supervisor): .....

Signature

Dr. Christine Kaseba
Senior Lecturer in Obstetrics and Gynaecology
School of Medicine
University of Zambia

CERTIFICATE OF APPROVAL

This dissertation, POST-CAESAREAN SECTION COMPLICATIONS AT THE UNIVERSITY TEACHING HOSPITAL, LUSAKA by Dr. MARIE JEANNE MUKESHIMANA, has been approved by the Board of Examiners as fulfilling part of requirements for the award of the degree of master of Medicine in Obstetrics and Gynaecology by the University of Zambia.

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ABSTRACT

This study is aimed at identifying the post-caesarean section complications and risk factors in the University Teaching Hospital. The post-caesarean section complications were determined after closely following up 300 patients who had undergone caesarean delivery from 1st January 2005 to 30th June 2005. The period of observation was from the first day of the operation up to six weeks.

The findings were that 114 out of 300 (38%) developed complications among which pyrexia was the commonest (29.6%), followed by wound infection (2.3%). A significant association was found between the number of vaginal examinations and pyrexia ($p < 0.001$). Those who had less than four vaginal examinations were less likely to develop pyrexia (OR: 0.64, 95% CI 0.45, 0.91) than those who had more than four. Patients who were of primary or no education were more likely to have pyrexia (OR: 1.40, 95% CI [1.05,1.87]).

The length of labour prior to the caesarean section was significantly associated with the development of pyrexia ($p<0.005$). Patients who spent less than 12 hours in labour were less likely to develop. Interestingly enough having ruptured membranes for more than 6 hours before the section did not have any particular impact of the occurrence of pyrexia and this finding is at variance with most of the literature.

To Ake, Uwe and Egide Shirimpaka my dear family. You mean the world to me. Thank you for your support and encouragement.

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TABLE OF CONTENTS

Page

1. List of tables.....viii
2. List of figures.....ix
3. List of abbreviations x
4. Introduction.....1-2
5. Study justification:.....3
6. Literature review:.....4-11
7. Patients and methods: 12-15
8. Ethical consideration:.....15
9. Results: 16-33
10. Discussions: 34-36
11. Conclusion:.....37-38
12. Recommendations.....38
13. References:.....40-42
14. Appendix: 43-50
18. REFERENCES.....42

LIST OF TABLES

Table I.	Patients current medical conditions	20
Table II.	Duration of labour expressed in hours	23
Table III.	Indication for caesarean sections	24
Table IV.	Fetal part presentation	24
Table V.	Operation outcome	26

LIST OF FIGURES

Figure 1.: Studied patients age distribution.....16

Figure 2.: Education level of investigated patients.....17

Figure 3: The parity for investigated patients.....18

Figure 4: Patients Marital Status.....19

Figure 5: Time Interval Between Rupture of Membranes and Caesarean Section..21

Figure 6: Number of vaginal examination (V.E) before caesarean section.....22

Figure 7: Caesarean section complications.....26

Figure 8: Day of hospital stay on which patients developed pyrexia.....27

Figure 9: Development of pyrexia related to patients' age.....28

Figure 10: Pyrexia related to the patients' level of education.....28

Figure 11: Relationship between vaginal examination and pyrexia.....29

Figure 12: Association between the duration of labour and developing pyrexia.....30

Figure 13: Relationship between development of pyrexia and the rank of the operating surgeon.....31

Figure14: Pyrexia and patients who had rupture of membranes before caesarian Section.....32

ABBREVIATIONS

1.	APH:	Antepartum Haemorrhage
2.	ASA:	American Society of Anaesthetists
3.	BMI:	Body Mass Index
4.	CPD:	Cephalopelvic Disproportion
5.	C/S:	Caesarean Section
6.	DVT:	Deep Venous Thrombosis
7.	HIV:	Human Immunodeficiency Virus
8.	JRMO:	Junior Resident Medical Officer
9.	MICU:	Main Intensive Care Unit.
10.	O. T:	Operating Theatre
11.	RTI:	Respiratory Tract Infection.
12.	SHO:	Senior House Officer
13.	USA:	United States of America
14.	UTH:	University Teaching Hospital
15.	UTI:	Urinary Tract Infection.
16.	VVF:	Vesico-Vaginal Fistulae

1. INTRODUCTION

Caesarean section is one of the most common surgical operations done at the University Teaching Hospital of Lusaka (UTH). Approximately 2000 caesarean sections are performed in UTH per year. The caesarean section rate at the UTH is 20.6 percent[1], that is acceptable given that it is a national referral hospital.

Caesarean section is a major abdominal surgical procedure that is subject to the common medical, anaesthetic, and surgical complications that are associated with any laparotomy. This operation carries more risks for both mother and child compared to vaginal delivery. There is no doubt that maternal morbidity and mortality are dramatically increased in caesarean sections compared with vaginal delivery. In addition, it is a known factor that maternal morbidity and mortality associated with caesarean section are increased in women with preexisting medical disorders. Other factors that increase morbidity include emergency caesarean sections, in which events surrounding labour such as prolonged rupture of membranes and multiple vaginal examinations amplify the risk for infection.[2]

Common risk factors for the development of post caesarean infection are young age, low socioeconomic status, obstructed labour due to a specified cause, prolonged labour, poor preparation of the patient and skills of the surgeon.[3] These risk factors are not uncommonly found in our labour ward.

However, In order to prevent some post-caesarean section complications, the following measures are routinely carried out at UTH as standard practice:

- Treatment dose of antibiotics is given to every post-caesarean section patient
- Preoperative antibiotics are given to selected patients such as those with premature rupture of membranes, obstructed labour, and this is continued as a treatment in the post-partum period.
- Saline Peritoneal wash is done and abdominal drains are left in case of sepsis.
- In patients with obstructed labour, bladder catheter is left in situ for seven to ten days.
- Early mobilization is done: post-caesarean section patients are encouraged to be ambulating from day one after the operation.

Although these measures may prevent some sepsis and bladder injury related complications, other complications still arise.

At UTH Lusaka however, the incidence and extent of complications related to this frequently performed operation are not well known. We submit that when the incidence of complications of an operation in a given centre is not known, it becomes be difficult to put up measures intending to effectively mitigate the problem, assess their efficacy and evaluate the quality of operative care delivery. This study is therefore necessary and justified, in that it identifies the types and extent of complications related to caesarean sections at UTH.

2. STUDY JUSTIFICATION

There is insufficient data on the post caesarean section complications and related risk factors at the University Teaching Hospital. The availability of such data that this study pledges to provide would help the institution to formulate guidelines aimed at reducing the risk factors and therefore the post caesarean section morbidity and mortality.

3. OBJECTIVES

3.1. Main objective

To identify post-caesarean section complications occurring at the UTH Lusaka.

3.2. Specific Objectives

1. To determine the risk factors associated with the different post-caesarean section complications
2. To determine the incidence rate of specific post-caesarean section complications.

5. LITERATURE REVIEW

Most deliveries in Zambia and worldwide are vaginal, and caesarean sections are mostly done when there is a risk to either mother or infant. Rates of caesarean section vary from centre to centre and country to country. Higher rates of caesarean section are being observed in developed countries (where there is increasing number of women deciding in favor of caesarean section in order to avoid labour pains associated with vaginal delivery) than in the developing ones. In some areas of UK, caesarean section rates are as high as 50 percent[4]. However, when strict obstetrical indications are adhered to, caesarean section is performed in 15-25 percent of all deliveries in most developed countries. In Arabic countries, this rate is estimated to be 10.3 percent[5]. The World Health Organization recommends a caesarean section rate not exceeding 15 percent of all deliveries. In Zambia, the national caesarean section rate is not documented, but for the University Teaching Hospital Lusaka it is 20.6 percent [6]

There is a number of clinical indications for caesarean section: fetal distress, placenta praevia; cord prolapse; previous caesarean section(s); malpresentation; abnormal lie; antepartum haemorrhage; multiple pregnancies; macrosomia; pre-eclampsia; intra-uterine growth retardation; cephalo-pelvic disproportion; grand multiparity; bad obstetric history and some congenital abnormalities. In short, the procedure is indicated whenever the risk to the mother or the fetus or both during vaginal delivery exceeds that of caesarean section.

Being a major surgical procedure, caesarean section is also likely to be accompanied by complications. Considering the importance of this operation in obstetrics, a number of researchers looked with great interest into complications of caesarean section in order to be able to prevent, reduce or mitigate them.

In a prospective population-based cohort study in Norway, Hager studied 2751 caesarean deliveries to determine complication rates and to identify independent risk factors for complications[7]. Intra-operative complications, blood loss, wound infection, cystitis, endometritis, haematoma and re-operation were the observed complications. He found that altogether 21.4 percent of the women had more than one complication. The most important independent risk factor was the degree of cervical dilatation at the time of operation. For caesarean sections performed at nine to 10 cm of cervical dilation, the complication rate was 32.6 percent as opposed to 16.8 percent when the operation was done with a closed cervical os. Other identified independent factors were general anaesthesia, low gestational age, and fetal macrosomia.

In similar study determining the rate and types of post-caesarean complications carried out in 1983 in 1319 women, Nielsen found the overall complication rate to be 14.5 percent and the most common complication was infection (13.3 percent), specifically endometritis (6.6 percent), urinary tract infection (3.1 percent), and wound infection (1.6 percent) [8].

Four significant factors that predispose to postoperative morbidity were identified, namely the duration of ruptured membranes prior to operation ($p < 0.001$), duration of labor prior to operation ($p < 0.001$), anemia ($p < 0.01$), and obesity ($p < 0.01$). Patients with a combination of risk factors had an increased complication rate, in some cases as high as 91 percent [9].

Wound infection is obviously one of the most common complications arising after caesarean section. Its rates vary from centre to centre. In a prospective multicentre study of 1032 caesarean sections performed to identify risk factors for postoperative wound infection, the overall rate of wound infection was 6.6 percent[10].Vermillion found wound infection rate of 7.8 percent in his study group[11].

In his retrospective study of the 'Incidence of Post-Caesarean Section Complications' at UTH, Phiri reported that the most prevalent complication was wound infection at a rate of 12.7 percent[12]. Others reported wound infection rate associated with caesarean section to range from 2.5 percent to 16.1 percent[13,14,15].

In general, several investigators have been unanimous on the fact that wound infection is higher in emergency caesarean sections than in elective ones. Pelle identified 3.8 percent of wound infection in elective cesarean sections compared to 7.5 percent wound infection rate following non-elective operations[10]. Nielsen found an infection rate of 4.7 percent for elective cases versus 24.2 percent for all emergency caesarean sections[8].

With regard to microorganisms causing wound infection, a mixture of anaerobic and aerobic bacteria (E *coli*, *Proteus mirabilis,* Bacteroides spp., beta hemolytic streptococci) was isolated from post caesarean section wound infection, similar to those of postpartum endometritis. *Staphylococcus aureus* may be isolated from post caesarean wound infection in 25 percent of cases and appears to originate from the skin rather than the endometrium[15].

Several factors have been identified as playing an important role in the causation of post caesarean section wound infection. Obesity is recognised as a patient-related risk factor for wound infection[10]. A study done at the Medical University of South Carolina, Charleston USA aimed at estimating the effect of the thickness of subcutaneous tissue at the site of surgery on abdominal wound infection after caesarean delivery, found that risk factors identified as significantly associated with wound infection by univariate analysis were thickness of subcutaneous tissue, maternal weight, and BMI. The author concluded that thickness of subcutaneous tissue appears to be the only significant risk factor associated with abdominal wound infection after caesarean delivery (with a relative risk of 2.8) [10].

In a different investigation, Wall[16] studied the relationship between the type of skin incision and postoperative wound complications in an obese population. The overall incidence of wound complications in his study group of 239 severely obese patients (BMI greater than 35) was 12.1 percent. Factors associated with

wound complications included vertical skin incisions and endometritis. A high preoperative haematocrit was protective. No other factors were found to impact wound complications. He concluded that primary caesarean delivery in the severely obese parturient has a high incidence of wound complications, and his data indicate that a vertical skin incision is associated with a higher rate of wound complications than a transverse incision.

Another known risk factor for post-cesarean wound infection is the duration of ruptured membranes prior to operation. Several studies related the incidence of wound infection to the length of time of membrane rupture. In general, the longer the period of time the membranes are ruptured before caesarean section the higher the incidence of both wound infection and endometritis. Cunningham[17] reported that in patients whose membranes were intact at the time of caesarean section, the incidence of wound infection was zero percent and the incidence of endometritis 29 percent, but when the membranes had ruptured for up to six hours before C/S the incidence of wound infection was four percent while endometritis increased to 67 percent. The incidence of wound infection rose to 24 percent and endometritis to 85 percent when the membrane rupture period had been longer than six hours.

Furthermore, in order to identify risk factors associated with surgical site infections following caesarean sections, Killian[3] studied 765 women who underwent cesarean section. Using multiple logistic-regression analysis, he identified four factors independently associated with an increased risk of surgical

site infections following the operation namely; absence of antibiotic prophylaxis; length of surgery; number of prenatal visits; and length of time of ruptured membranes prior to caesarean section.

In a similar study done by Tran[18] on 969 women who delivered by cesarean section, there were febrile morbidity and infection complications in 16.2 percent and 12.4 percent of subjects, respectively. Ninety-five subjects had surgical site infections (9.8 percent), and seven risk factors were independently associated with infection. Those risk factors included preoperative remote infection; chorioamnionitis; maternal preoperative condition (those with severe systemic disease with ASA score $\geq$3); pre-eclampsia; higher body mass index; nulliparity; and increased surgical blood loss (OR 1.3 for every 100-ml increment). He concluded that host susceptibility and existing infections were important predictors of surgical site infection after caesarean delivery.

However, Vermillion's team brings in a striking controversy. In their study they state that there is no significant differences between women who developed wound infections and those who did not with respect to the duration of ruptured membranes, type of skin incision, number of vaginal examinations, chorioamnionitis and duration of surgery.[11]

Other documented risk factors for post-cesarean wound infection are omission of the use of plastic draping and disinfection of the skin before closure of the wound[10].

Surgical wound infection presents a serious hazard to patients. Local complications include tissue destruction, wound dehiscence, incisional and deep hernias, septic thrombophlebitis, recurrent pain, and disabling scars. Systemic complications include bacteraemia, shock, metastatic infection, multiple organ failure and even death. The severity of each complication depends largely on the infecting pathogen. Such an infection is an important cause of morbidity, mortality, and excess hospital costs[8].

Endometritis is another very important complication of cesarean section. In the absence of prophylactic antibiotics, post caesarean endometritis occurs with an incidence of 20-40 percent[18,19]. Postoperative infection may be reduced by 50-60 percent with the use of prophylactic antibiotics at the time of caesarean delivery[18, 20].

In approximately 10 percent of cases, concurrent bacteraemia will accompany post caesarean endometritis[18,19]. Uncommonly post-caesarean section endometritis may be complicated by pelvic abscess, septic shock and septic pelvic thrombophlebitis. The major risk factors for the development of post caesarean endometritis are young age, low socioeconomic status[13], prolonged labor, prolonged ruptured membranes and multiple vaginal examinations.

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Post caesarean endometritis is a polymicrobial infection secondary to bacteria normally present in the lower genital tract namely; aerobic streptococci (Group B and D streptococci), anaerobic gram-positive cocci, aerobic (E *coli*, K *pneumoniae*, Proteus spp and *Gardnerella vaginalis*) [21]

Evans compared the incidence of post caesarean endometritis in preterm and term deliveries and found that the preterm cases were more frequently complicated by post partum endometritis than term cases (32 versus nine percent)[22].

5. PATIENTS AND METHODS

5.1. Study site and duration

The study was carried out from 1st January through to 30th June 2005 in the Department of Obstetrics and Gynaecology of the University Teaching Hospital Lusaka.

5.1. Study design

This is an institutional based descriptive study

Sampling technique

The non-probability convenience sampling technique was used. Any consenting patient who presented to the department of Obstetrics and Gynaecology for and who had a caesarian section done during the stated study period and fulfilling the inclusion criteria was selected and included into the study.

Sample size: With the caesarean section complications being estimated at an estimate of 14 percent according to the literature, we fixed the confidence interval at 95 percent and a width of four percent, we calculated the sample size using the formula $N = \frac{p\,(100-p)\,[\,f(1-a)]}{W^2}$

where p stands for prevalence, f(1-a) is a constant factor for a given particular confidence interval (in our case f(1-a) for C.I of 95 percent is 3.842. Then the sample size is 294.20 rounded up to 295. However we recruited 300 patients.

Patient Selection

Inclusion criteria

Any patient of any parity who had undergone a caesarean section during the above stated study period and who signed an informed consent was included in the study.

Exclusion criteria

1. Patients who were not willing to give informed consent
2. Patients who had an established sepsis prior to the caesarean section.

Every patient delivered by caesarean section in the period stated above was approached, within 24 hours before the caesarean section for those having elective caesarean section, or 5 hours after the operation. They were given enough information about the study and the woman was recruited as long as she gave a written consent. No patient declined to participate.

The following were collected on daily basis:

a. Temperature – a temperature of more than 37.5^0C was taken as pyrexia
b. Haemoglobin – a haemoglobin of less than 10.5^0C was taken as anaemia
c. Wound infection - presence of pain or pus at the site of the incision, erythema, induration

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d. Duration of hospital stay – a stay of longer than 7 days was taken as abnormal

e. Any other problems that would arise

Data collection

A structured questionnaire was administered to patients who had undergone caesarean section and had consented to partake in the study. The questionnaire encompassed socio-demographic characteristics, reproductive history including the past and current medical and obstetric history, questions related to the labour and the well being of the post operative patient. (See Appendix III).

Each study subject was monitored to detect any possible caesarean related complications they would develop. They were seen on a daily basis from the day of their surgery till they were discharged. They were reviewed twice as outpatients: one week after discharge and six weeks after the caesarean section. The principle investigator and a medical student who was trained, collected data everyday from patients who were in wards. A contact telephone number had been provided to the patients in the event of any complications arising.

Data analysis

All the information was analysed using Epi info version 6. Tables were generated, cross tabulation was done and p values were generated to assess the

association between a complication and a risk factor, logistic regression analysis was done.

ETHICAL CONSIDERATIONS

This research project involving human beings was approved the Research Ethics Committee of the University of Zambia. All study participants gave an informed consent to freely be included in the study. Even after freely consenting to the participation in the study, any one was free to withdraw anytime though this was not encouraged. The study subjects were treated with dignity and respect.

Study subject record confidentiality was maintained. There were no major ethical issues raised

6. RESULTS

6.1. DESCRIPTION OF DEMOGRAPHICS OF ALL SUBJECTS ASSESSED (N=300)

6.1.1. Age

The majority of patients were in the 20-24 years age group that accounted for 29.3 percent. Patients between 15 and 19 years accounted for 15.3 percent. Figure 1 depicts age distribution of all the studied subjects

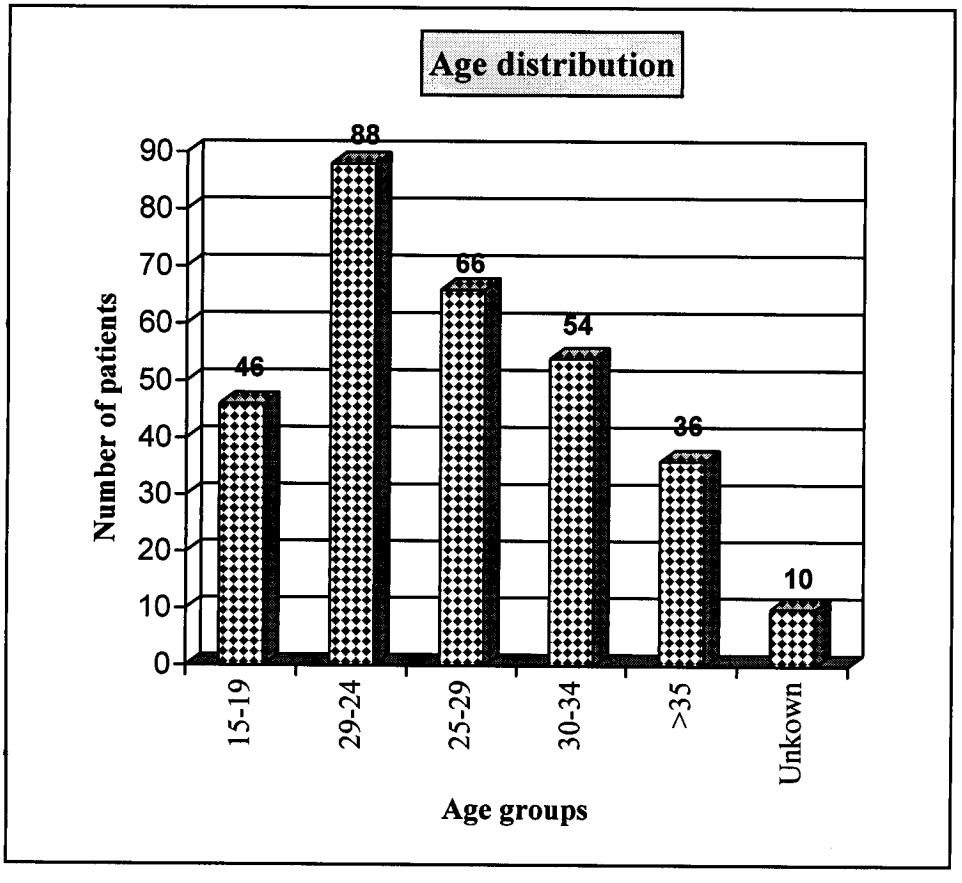


Figure1: Studied patients age distribution

6.1.2. Educational level

The majority of the patients had primary or no education at all (56.7 percent). Only 5.0 percent of patients attended college or university education as shown in figure 2.

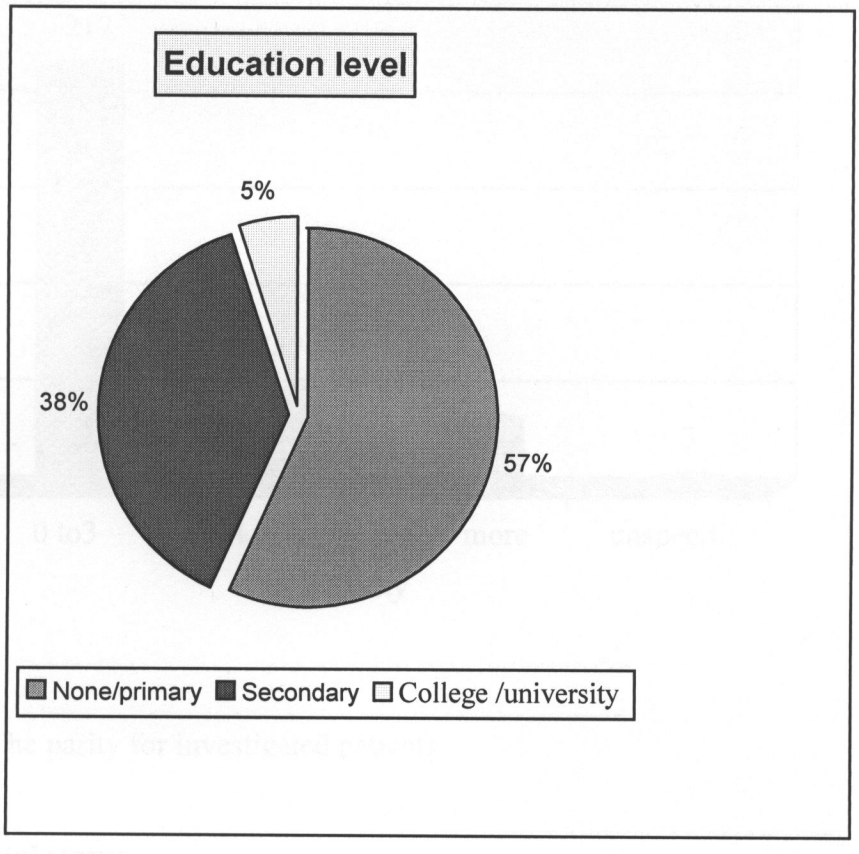


Figure 2: Education level of investigated patients

6.1.3. Parity

The majority of the patients had less than three pregnancies

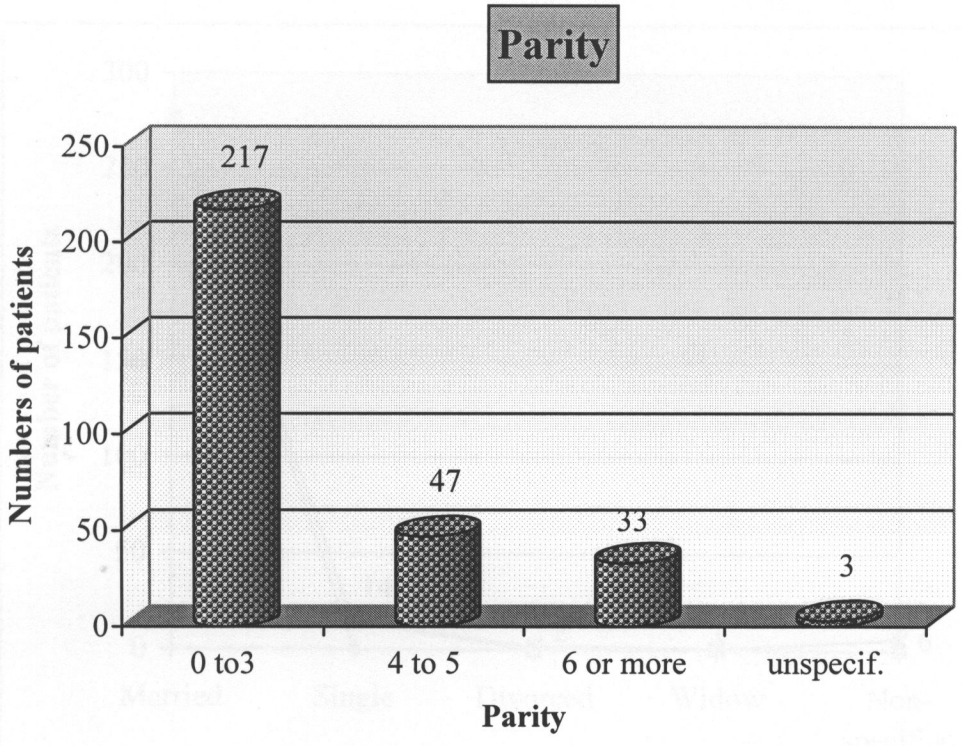


Figure 3: The parity for investigated patients

6.1.4. Marital status

The large majority of the patients were married (92.33 percent) while only 4.7 percent were single as illustrated in figure 4.

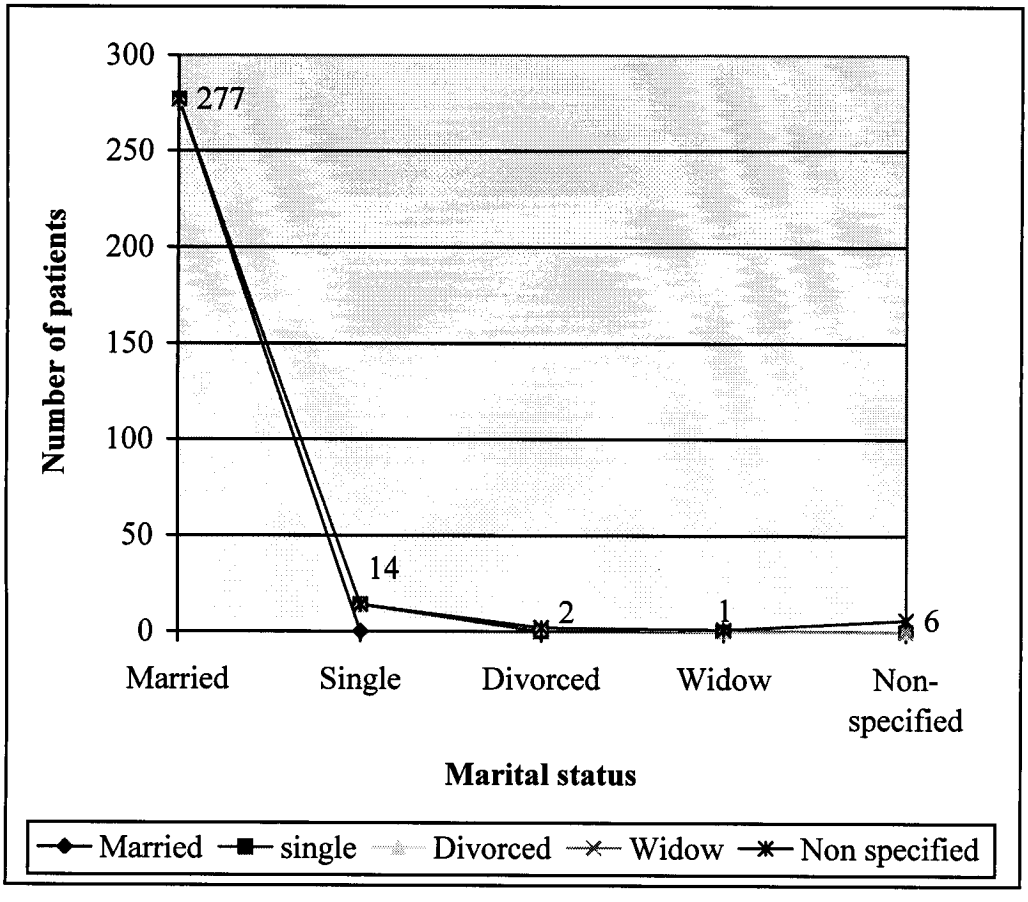


Figure 4: Patients Marital Status

6.1.5. Medical condition of patients

The majority of the patients (81 percent) did not have any medical condition, 11.7 percent had an HIV related illness and 4.7 percent were hypertensive. Table 1 depicts the health status (current medical conditions) of all the patients.

Current Medical condition	Number	Percent (%)
Anaemia	1	0.3
HIV related	35	11.7
Hypertension	14	4.7
RTI	1	0.3
Nil	243	81.0
Others	6	2.0
Total	**300**	**100**

Table 1: Patients current medical conditions

6.2. EVENTS SURROUNDING LABOUR

6.2.1. Duration of rupture of membranes.

The majority of patients (67.6 percent) had their membranes ruptured for less than 12 hours before having a caesarean section, but for 5.6 percent of patients, the membranes were ruptured for more than 24 hours before delivering by caesarean section. 18 percent of patients were taken to theatre with intact membranes as depicted in figure 5

6.2.2. Number of vaginal examinations.

The majority (55.3 percent) of patients had five to eight vaginal examinations, and 6.3 percent of patients had more than eight vaginal examinations before the caesarean section. There was no vaginal examination performed for 14 patients (4.7 percent), either the caesarean section was an elective operation or there was a contraindication to the vaginal examination, such as in placenta praevia. Figure 6 shows the number of vaginal examinations that were done before the patients had the caesarean section

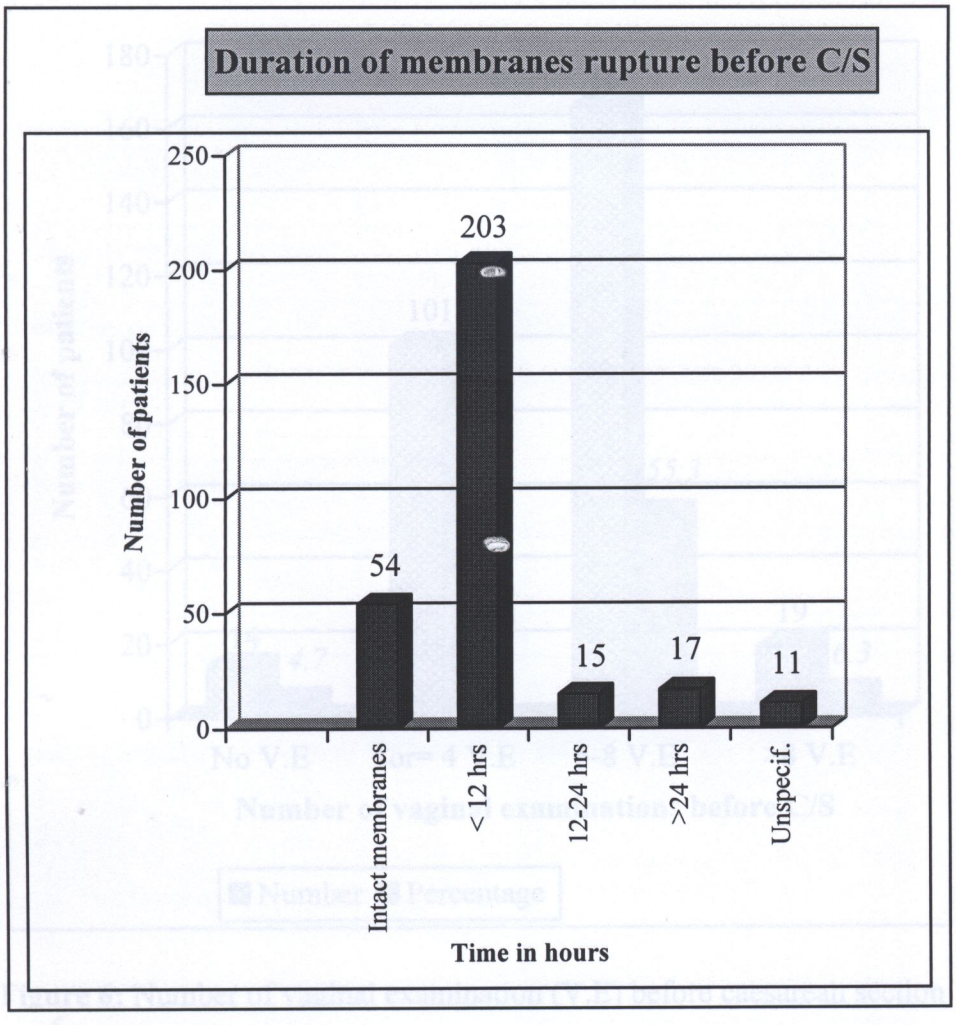


Figure 5: Time Interval Between Rupture of Membranes and Caesarean Section

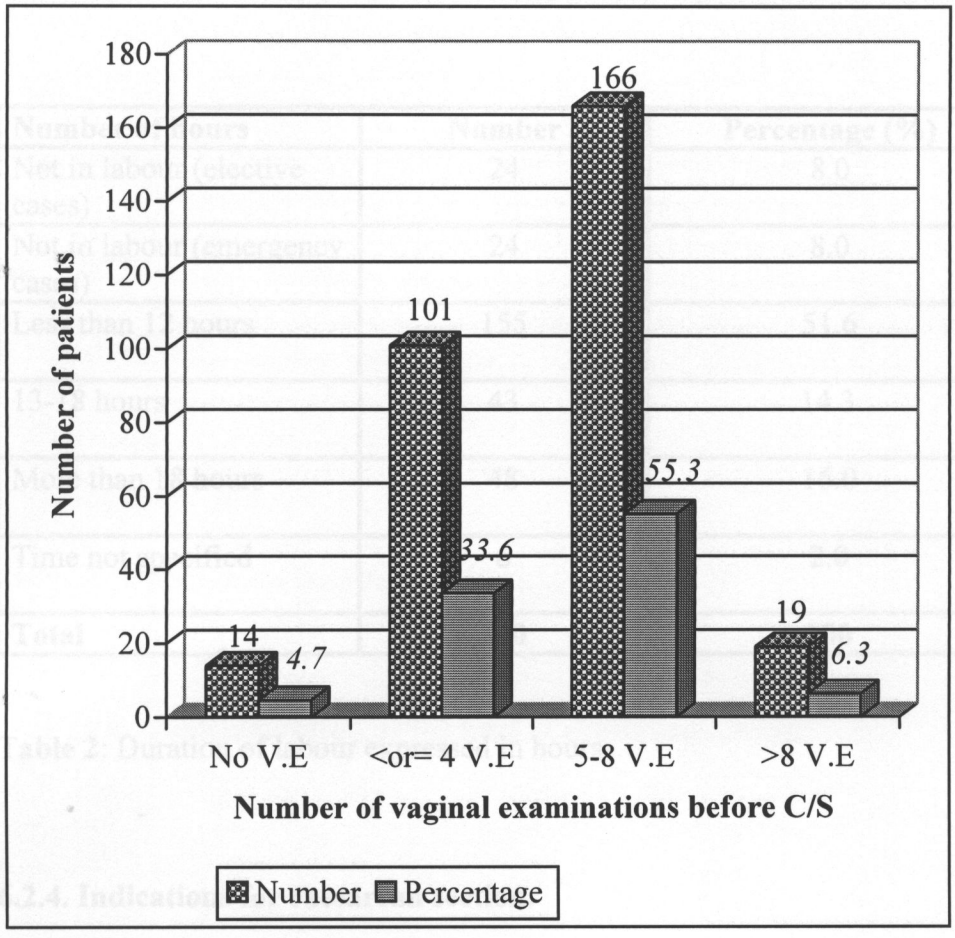


Figure 6: Number of vaginal examination (V.E) before caesarean section

6.2.3. Duration of labour

The majority of patients (51.6 percent) spent less than 12 hours in labour. 16.0 percent of patients spent more than 18 hours in labour. The latter group consisted of patients referred from other health facilities. 16 percent of patients were not in labour at the time they were taken for caesarean section. This was either an elective setting or an emergency before labour had started. Table 2 shows the duration of labour.

Number of hours	Number	Percentage (%)
Not in labour (elective cases)	24	8.0
Not in labour (emergency cases)	24	8.0
Less than 12 hours	155	51.6
13-18 hours	43	14.3
More than 18 hours	48	16.0
Time not specified	6	2.0
Total	**300**	**100**

Table 2: Duration of labour expressed in hours

6.2.4. Indications for caesarean section.

Suspected cephalo-pelvic disproportion (CPD) was the most common indication for caesarean section (32,3 percent), followed by "previous caesarean section" (15.7 percent). The latter included two previous caesarean section and previous caesarean section with an added obstetric complication. Fetal distress accounted for 10.3 percent, and breech presentation for 12.7 percent. Among 'others' were cord prolapse, PMTCT, fetal compromise and previous uterine rupture. Table 3 depicts all the indications for the performed caesarean sections.

Indication for CS	Number	Percent (%)
Suspected CPD	97	32.3
Fetal distress	31	10.3
APH	20	6.7
Breech	38	12.7
Previous C/S	47	15.7
Eclampsia	12	4.0
Malpresentation	20	6.7
Failed induction	9	3.0
Others	23	7.7
Nil	3	1.0
Total	**300**	**100**

Table 3: Indication for caesarean sections

6.2.5. Presenting featal part at the time of caesarean section

The common presenting part was cephalic (71.3 percent), while breech presentation accounted for 13.3 percent as shown in table 4.

Fetal part Presentation	Number	Percent (%)
Cephalic	214	71.3
Breech	39	13.3
Cord	1	0.3
Hand	9	3.0
Shoulder	2	0.7
Not specified	35	11.7
Total	**300**	**100**

Table 4: Fetal part presentation

6.3. COMPLICATIONS ASSOCIATED WITH C/S

The majority of patients had no complications (62.0 percent). For those who had a complication, pyrexia was the most common complication, accounting for 29.6 percent. Wound infection only accounted for 2.3 percent while anaemia was seen in three percent of post-operative patients as illustrated in table 5.

One patient died from postpartum haemorrhage. She had had a previous caesarean section and during surgery it was discovered she had placenta accreta for which a hysterectomy was performed. Among anaesthetic complications, one patient was admitted to MICU due to faulty intubation. Paralytic ileus was diagnosed in two patients while one patient developed DVT two weeks after the caesarean section. Figure 7 depicts all the caesarean section complications.

Operation outcome	**Number**	**Percent (%)**
Anaemia	9	3.0
Death	1	0.33
Faulty intubation	1	0.33
Haemorrhage	1	0.33
Paralytic ileus	2	0.66
DVT	1	0.33
Pneumonia	1	0.33
Pyrexia	89	29.6
UTI	1	0.33
Wound infection	7	2.3
VVF	1	0.33
No complications	186	62.0
Total	**300**	**100**

Table 5: Operation outcome