



ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

PREVALENCE AND OBESTETRIC FACTORS AFFECTING THE
SUCCESS OF INDUCTION OF LABOR AMONG WOMEN WHO
ATTENDED INDUCTION AT ST. PAUL'S HOSPITAL
MILLENNIUM MEDICAL COLLEGE: A RETROSPECTIVE STUDY
FROM APRIL 1ST TO JUNE 30, 2016.

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ABSTRACT

Background: Induction of labor is the artificial stimulation of uterine contractions before the spontaneous onset of true labor at 28 or more weeks of gestation to achieve vaginal delivery.^[17] Induction of labor is a lifesaving intervention aimed at preventing fetal and or maternal jeopardy which may arise in some conditions where further prolongation of pregnancy has become life threatening.^[1]

Objectives: This study aims to assess the prevalence and factors affecting success of induction of labor among women who attended induction at St. Paul's Hospital Millennium Medical College.

Methods: The study is an institution based retrospective cross sectional research. SPSS version 20.0 was used for analysis. And binary and multivariate regression was used to identify the association between success of induction and its factors.

Result: Among the 398 women, 57.8 % of them undergone successful induction of labor while the rest 42.2 % of them have failed induction which means they failed to give birth vaginally and undergone cesarean section. The affecting factors are gestational age of the fetus at the time of induction, rupture of membrane before the induction, total intravenous oxytocin use, uterine hyper stimulation, non-reassuring fetal heart rate pattern, staining of the liquor with meconium, diastolic blood pressure after induction, time interval between start of labor and delivery, and indication of induction.

Conclusion: Generally, this study has shown that the prevalence of successful induction at SPHMMC was 57.8 %.

Recommendation: This study recommends the hospital to develop clear induction policy. In addition to this, full documentation of charts is recommended.

Key words: Induction, successful induction of labor, failed induction of labor, cesarean section

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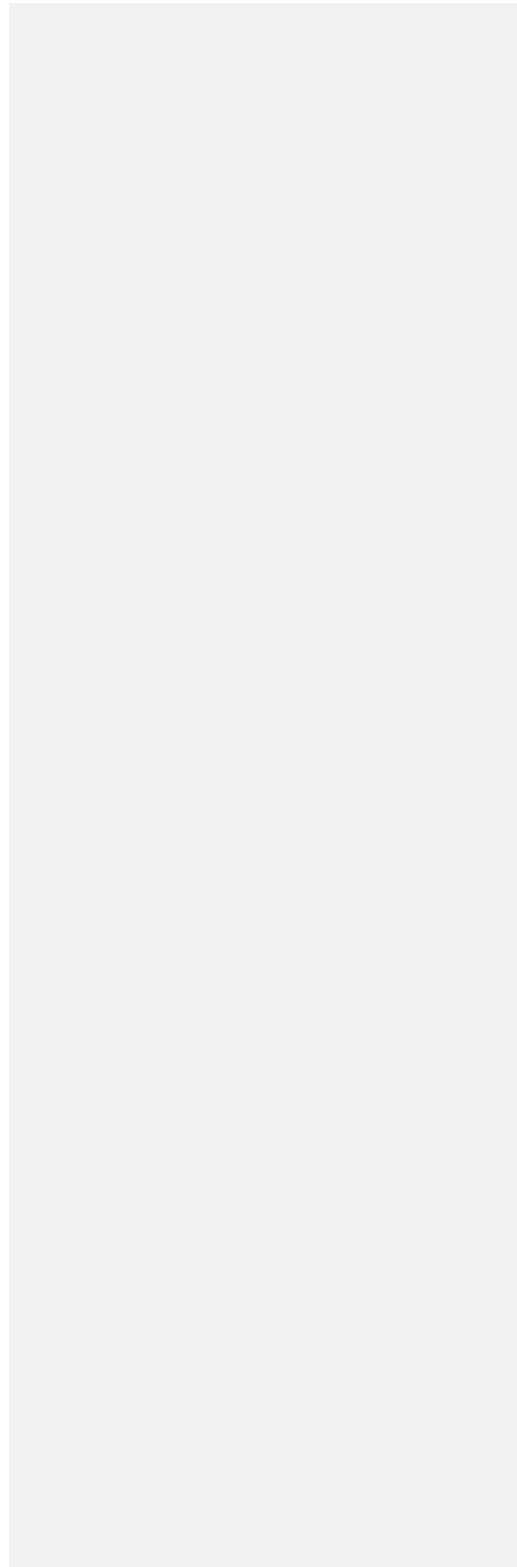
ABBREVIATIONS

1. AOR: Adjusted Odds Ratio
2. CS: Cesarean Section
3. EDHS: Ethiopia Demographic and Health Survey
4. FMOH: Federal Ministry of Health
5. ICU: Intensive Care Unit
6. IOL: Induction of Labor
7. IUFD: Intrauterine Fetal Death
8. MDG: Millennium Developmental Goal
9. MMR: Maternal Mortality Rate
10. NICU: Neonatal Intensive Care Unit
11. OR: Odds Ratio
12. SCBU: Special Care Baby Unit
13. SPHMMC: St. Paul's Hospital Millennium Medical College
14. WHO: World Health Organization

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1. INTRODUCTION

1.1. BACKGROUND

Ensuring the delivery of a healthy baby to a healthy mother in a contented family is the overall goal of Safe motherhood. Achieving this goal sometimes may require the delivery of the fetus before the spontaneous onset of labor to prevent adverse outcome to the baby and or the mother. Intervention becomes necessary when on critical assessment of the obstetric balance; the benefit of terminating the pregnancy far outweighs the benefit of continuing it^[1].

The two available options of terminating the pregnancy at this stage is either induction of labor or caesarean section. The decision on appropriate option depends on the risk assessment of the fetus and the pregnant woman. Over the years, various professional societies have recommended the use of induction of labor in circumstances in which the risks of waiting for the onset of spontaneous labor are judged by the Obstetricians to be greater than the risks associated with shortening the duration of pregnancy by induction of labor^[2].

Induction of labor refers to the iatrogenic stimulation of uterine contractions before the onset of spontaneous labor to accomplish vaginal delivery.^[3]

Researchers demonstrated that undergoing induction of labor for any reason increases the risks for a number of complications for the woman and her infant. For the woman, induced labor results in more postpartum hemorrhages than spontaneous labor, which increases the risk for blood transfusion, hysterectomy, placenta implantation abnormalities in future pregnancies, a longer hospital stay, more hospital re-admissions, and in the worst case scenario, death^[6].

For the infant, a number of negative health effects are associated with induction. They include more fetal stress, more respiratory illness, more separation from the mother, interrupted bonding, less breastfeeding, and therefore more childhood obesity and chronic illness. Additionally, when complications occur, infants are more likely to be admitted to the neonatal intensive care unit (NICU) and have longer hospital stays and more hospital re-admissions^[6].

Therefore, studying the success of induction is important in identifying the factors that affecting its success and helps to improve quality of induction of labor and decrease unnecessary indication of the procedure.

1.2. STATEMENT OF THE PROBLEM

Globally, at least 585, 000 women die each year by complications of pregnancy and child birth. More than 70% of all maternal deaths are due to five major complications: hemorrhage, infection, unsafe abortion, hypertensive disorders of pregnancy, and obstructed labor. The majority of maternal deaths (61%) occur in the postpartum period, and more than half of these take place within a day of delivery^[8].

The EDHS 2011 shows the maternal mortality ratio is 676 per 100,000 live births, which is almost the same to 2005 EDHS's report (673 maternal deaths per 100,000 live births)^[11].

According to a report in 2015, Ethiopia's maternal mortality has decreased to 420 per 100,000 live births^[12].

Induction of labor is directly relevant to the reducing maternal mortality as it has potentials for preventing maternal complications and improving pregnancy outcome^[13].

Beyond 41 weeks' gestation, the number of routine induction of labor needed to prevent fetal or neonatal death decreases constantly. Higher rates of induction of labor may also contribute to lowering caesarean section rates without increasing other adverse pregnancy outcomes. In otherwise uncomplicated singleton pregnancies, meta-analysis of randomized controlled trials showed that a policy of induction of labor at 41 weeks reduces caesarean section rates without adverse perinatal outcomes. Minimizing caesarean section rates without increasing other adverse pregnancy outcomes is a priority consideration in low income countries where available resources need to be judiciously utilized^[14].

Induction of labor is directly relevant to the health related Millennium Development Goals (MDGs). It has potentials for preventing maternal complications and improving pregnancy outcome^[15].

1.3. SIGNIFICANCE OF THE STUDY

Induction of labor is an important practice that is carried out commonly in modern day obstetrics. The procedure is not always successful and sometimes fails to achieve a safe vaginal delivery.

Little is known about factors that lead to success of induction of labor at St. Paul's Hospital Millennium Medical College. This study therefore will identify those factors. This will enable the institution and the healthcare providers to have data when counseling women for induction. It also helps in informing evidence-based protocols on induction of labor in a local setting.

The importance of this study is to evaluate the prevalence of labor induction success, and factors associated with successful IOL. To the best of my knowledge there is a paucity of such studies in literature. Therefore, knowledge of the determinants of IOL outcome in Hospitals may be employed as a foundation for a database to monitor rates, and outcome of IOL in similar hospitals found in the country. It can also be used to improve future quality of care provided for woman who needs induction of labor in the hospital.

2. LITERATURE REVIEW

2.1. INDUCTION OF LABOR

Induction of labor is the artificial stimulation of uterine contractions before the spontaneous onset of true labor at 28 or more weeks of gestation to achieve vaginal delivery.^[17]

Generally, induction of labor has merit as a therapeutic option when the benefits of expeditious delivery outweigh the risks of continuing the pregnancy.^[18]

Labor induction may be indicated by medical or obstetrical complications of pregnancy or may be requested or chosen for non-medical or social reasons. When a woman and her care provider decide that labor induction is desired, they must next choose a method of induction. Several factors may influence the choice of method for induction of labor including cervical and membrane status, parity, and patient and provider preference.^[19]

Depending on the indication, the induction is conducted in an elective (planned) or emergency basis. When the indication incurs immediate and serious complication, emergency induction is undertaken; e.g. eclampsia, severe abruptio placentae. On the other hand, when the indication entails an early phase of a relatively gradual progressing complication (e.g. post term pregnancy, PROM, IUFD), elective induction is preferred.^[17]

Indications of IOL can be absolute or relative. The following are absolute indications for induction of labor: Hypertensive disorders (Preeclampsia/eclampsia), Maternal medical conditions (Diabetes mellitus, Renal disease, Chronic pulmonary disease), Prelabor rupture of membranes, Chorioamnionitis, Fetal compromise (Fetal growth restriction, Isoimmunization, Non reassuring antepartum fetal Testing), Oligohydramnios, Fetal demise, Postdates pregnancy (>42 weeks).^[3]

Hypertensive disorders (chronic hypertension), Maternal medical conditions (Systemic lupus erythematosus, Gestational diabetes, Hypercoagulable disorders, Cholestasis of pregnancy), Polyhydramnios, Fetal anomalies requiring specialized neonatal care, Previous stillbirth, Post term pregnancy (>41 weeks), and Logistic factors (Risk of rapid labor, Distance from hospital, Psychosocial indications, Advanced cervical dilation) are some of the relative indications of labor.^[3]

There are some conditions in which IOL is absolutely or relatively contraindicated. Prior classical uterine incision or transfundal uterine surgery, Active genital herpes infection, Placenta or vasa previa, Umbilical cord prolapse, Transverse or oblique fetal lie, and Absolute cephalopelvic disproportion (as in women with pelvic deformities) are some of the accepted contraindications of IOL. On the other hand; Cervical carcinoma, Funic presentation, and Malpresentation (breech) are the relative contraindications.^[3]

Induction of labor can be achieved by surgical or medical methods or by a combination of both. A popular method of labor induction in term of pregnancies is fore water amniotomy and synchronous oxytocin infusion. This has been employed for more than fifty years. Although prostaglandins are widely used for this purpose along with oxytocin in developed countries, oxytocin alone remains the major drug for medical induction in the developing nations.^[20]

Induction of labor has been associated with poor maternal and perinatal outcomes compared with spontaneous labor. Despite this, studies show that it is the fastest growing medical procedure.^[21] According to WHO, up to 25% of all deliveries at term involve induction of labor in developed countries, but generally lower in developing countries. However, in some settings in developing countries induction of labor is as high as those observed in developed countries.^[7]

According to a survey on Maternal and Neonatal Health done by WHO, IOL accounted for 4.4% (Africa) and 12.1% (Asia) of deliveries. Oxytocin alone was the most common method (45.9% and 37.5%) and success rates were generally over 80%. Medically indicated inductions were associated with increased adjusted odds of Apgar ,7 at 5 minutes, low birthweight, NICU admission and fresh stillbirth in both regions. The odds of caesarean section in Africa were reduced (Adj OR 0.61, 95%CI 0.42–0.88). Elective induction was associated with increased adjusted odds of NICU (Africa) and ICU (Asia) admissions.^[22]

The incidence of labor induction has increased over the last decade.^[23] The rate of labor induction varies by location and institution, and is increasing. In the United States and Canada, it is greater than 20%.^[18] the incidence of induction in Canada has steadily increased from 1991 (12.5%) to 2000 (27.2%).^[15]

Although induction of labor with oxytocin is a daily practice at public and private health institutions, there is only one published study done in Ethiopia in 2004. According to this two

years' retrospective case-series from two teaching hospitals in Addis Ababa, the prevalence of induction at term and post-term was 4% in both institutions. ^[15]

According to a research done in Niger Delta, Nigeria, the incidence of induction was 6.5% and the three commonest indications were; prolonged pregnancy (51.7%), followed by Prelabor rupture of fetal membrane (31.7%), and hypertensive disorders of pregnancy (10.0%). Most of the patients had induction of labor with vaginal misoprostol 33(55.0%). Majority of the women had spontaneous vaginal delivery 51 (85.0%), while 9(15.0%) had emergency Caesarean section. The commonest indication for the Caesarean section is cephalopelvic disproportion 5(8.3%). The most common complication seen in the mothers is hyper stimulation 4(6.7%), while 7 (11.7%) of the babies were admitted into the special care baby unit (SCBU). ^[20]

Induction of labor in older mothers is widely practiced as an intervention perceived to reduce the risk of late stillbirth. ^{6,27} A recent survey showed that 37% of obstetricians offer induction of labor at term to women aged 40–44 years of age and 55% to those ≥ 45 years old. ^[24]

Around one in four pregnant women in the UK have their labor induced: the rates are 23-24% in England, Scotland and Wales, and 30% in Northern Ireland where maternity services are more medicalized. ^[25]

In a research done at the government medical college and Rajindra hospital, Patiala, Punjab, the incidence of induction of labor came out to be 13.86%. And the most common indications for IOL were postdated pregnancy (29.72%) and hypertensive disorders of pregnancy (28.77%). ^[26]

As to the research done at Kenyatta national hospital, Kenya, 62% of the women who were successfully induced, that is they delivered through vaginal delivery after being done induction of labor. The remaining 38% were undergone cesarean section because of failure of induction. ^[21]

According to the 2010 National Vital Statistics final report using the United States Standard Certificates for Live Births, the rate of induction of labor has increased by 140% between 1990 (9.5%) and 2007 (22.8%) for all births. Agency for Healthcare Research and Quality (AHRQ) reported that 1 of 2 women in the United States (51.4%) experience induction of labor, manual assisted delivery, and other interventions to assist with birth. ^[27]

According to the Australian and New Zealand journal of Obstetrics and Gynecology, among the 1,561,723 women with singleton pregnancies and cephalic-presenting fetuses, the rate of induction increased from 18.6% in 1990 to 26.2% in 2008, including an increase from 6.8 to 12.5% for nullipara at 37–41 weeks (term). There was a significant increase in the contribution of nullipara at term from 36.2 to 47.6% ($P < 0.0001$) of all inductions. ^[28]

2.2. FACTORS ASSOCIATED WITH FAILED INDUCTION OF LABOR

Failed induction refers to a situation where vaginal delivery cannot be achieved in a parturient on induction of labor and caesarean section has to be performed. Caesarean section may be indicated for a variety of reasons such as failure to achieve active phase of labor despite escalating oxytocin infusion, cephalopelvic disproportion, fetal distress or cord prolapse. ^[1]

According to study from Nepal induction failure rate was 53.8% when maternal age >30 y and 28.2% in those <30 y. In another study conducted in King Khalid University Hospital, Kingdom of Saudi Arabia, there was no association between maternal age and successful IOL. Based on study in factors and outcomes associated with the induction of labor in Latin America, it was found that mothers from the poor socio-economic areas were at a greater risk for poor pregnancy outcome. ^[13]

In a two years' retrospective research done at the Jimma University Specialized Hospital, Failed induction was diagnosed in 21.4% of the mothers. Primigravidity, unfavorable and intermediate Bishop Scores determined at admission were found to be predictors of failed induction. ^[18]

The success of labor induction after a previous cesarean section is related to a history of prior vaginal delivery, the indication of prior cesarean delivery, age, body mass index and ethnicity. The risk of uterine rupture is lower with mechanical dilators compared to prostaglandins when they are used for cervical ripening. Oxytocin is associated with an increased risk of uterine rupture in such women but induction and augmentation of labor is an option for all women undergoing a trial of labor after cesarean section. ^[29]

In a research done at Kenyatta National Hospital, Kenya, it was shown that 30 years and below were almost 2 times more likely to be successfully induced than above 30 years ($OR=0.614$, $p=0.350$). ^[21]

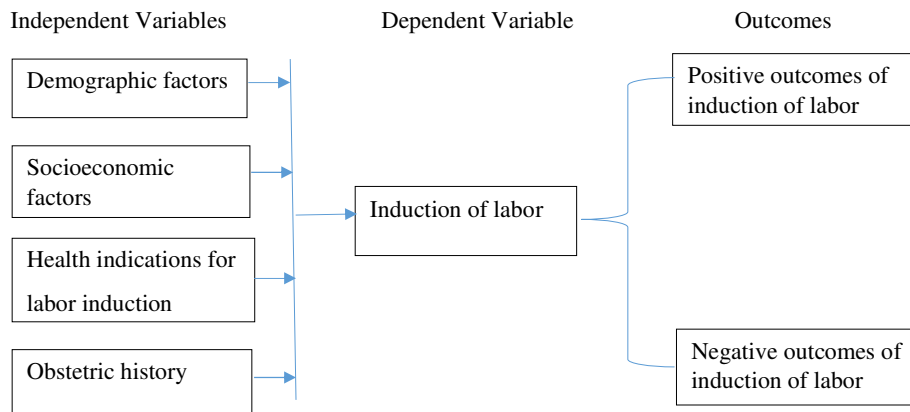
A research from Hawassa Ethiopia showed that prevalence of failed induction of labor was 17.3%. Multivariable logistic regression analysis showed that advanced maternal age [AOR 9.21 (2.70-31.35)], Nulliparity [AOR 3.11 (1.01-9.62)], poor Bishop Score [AOR 4.54 (1.56-13.19)], greater for gestation [AOR 6.57 (2.18-19.72)], bad obstetric history [AOR 5.60 (1.35-23.29)], post term [AOR=4.52 (1.20-17.00)] and premature rupture of membrane [AOR 5.66 (1.96-16.32)] were significantly associated with failed induction of labor. ^[30]

In a prospective study done in India, among the 248 participants, 200 patients (80.6 %) delivered vaginally, while 48 (19.4 %) underwent a cesarean section. Maternal age was one independent significant variable ($p=0.01$, OR 1.08) determining the risk of cesarean delivery. Patients affected by mild preeclampsia had a three times higher risk for cesarean section. ^[31]

In an institutional based retrospective cross-sectional study done in Army Hospital, Addis Ababa, Ethiopia, a total of 347 women's record reviewed, 207 (59.7%) of women who undergone induction had successful induction. Oxytocin IV infusion was the only method used for the purpose of induction. In addition, PROM, 167(48.1%) and postdate, 122(35.2%) were found to be the two most common reasons for induction. After controlling for other factors while women of age ≤ 24 years, Bishop Score greater than 5 and Apgar score greater than or equal to 7 at first minute were significantly more likely to have successful induction of labor. ^[13]

2.3. CONCEPTUAL FRAMEWORK

The conceptual framework means that demographic factors, social factors and institutional factors influence the outcomes of labor induction. Also the circumstance that necessitates labor induction influences the end result.



2.4. RESEARCH QUESTIONS

What is the prevalence of success of induction of labor at St. Paul's Hospital Millennium Medical College? What are the factors affecting the outcome of induction of labor among women attended induction at St. Paul's Hospital Millennium Medical College?

3. OBJECTIVES OF THE STUDY

3.1. GENERAL OBJECTIVES

To assess the prevalence and obstetric factors affecting induction of labor success among women who attended induction and delivered at St. Paul's Hospital Millennium Medical College from April 1st to June 30, 2016.

3.2. SPECIFIC OBJECTIVES

1. To determine the prevalence of induction of labor success
2. To determine obstetric factors affecting the success of induction of labor

4. METHODS AND MATERIALS

4.1. STUDY AREA

The study was conducted in [SPHMMC, located in](#) Addis Ababa, the capital city of Ethiopia and seat of African Union & United Nations World Economic Commission for Africa. Addis Ababa has a population size of over 3 million (3,038,096) with annual growth rate of 2.1% (data obtained from central statistical agency of Ethiopia). The city is divided into ten sub-cities and 100 Kebeles (lowest administrative units in Ethiopia).

Addis Ababa is located at 9° 1'48" North and 38° 44'24" East and the total land area is 54,000 hectares. Its average elevation is 2,500m above sea level, and hence has a fairly favorable climate and moderate weather conditions. ^[32]

The study was conducted in St. Paul's Hospital Millennium Medical Collage at OBGYN department. The department contains obstetric ward, gynecologic ward, labor ward, emergency OPD, regular OPD, E and C, mechu family planning center. The study was specifically conducted at the labor ward since its the only area induction is monitored

4.2. STUDY DESIGN

A retrospective chart review cross sectional study from April 1st to June 30, 2016

4.3. POPULATION

4.3.1. SOURCE POPULATION

The source population of the study is all women who had delivered at the labor ward of St. Paul's Hospital Millennium Medical College, Addis Ababa from April 1st to June 30, 2016.

4.3.2. STUDY POPULATION

The study population is all women who had undergone induction of labor at St. Paul's Hospital Millennium Medical College, Addis Ababa from April 1st to June 30, 2016, who satisfy the study inclusion criteria.

4.4. INCLUSION AND EXCLUSION CRITERIA

4.4.1. INCLUSION CRITERIA

All registered women who had been delivered through induction of labor at maternity wards at St. Paul's Hospital Millennium Medical College, Addis Ababa from April 1st to June 30, 2016.

- All registered women who had delivered at gestational age of 28 weeks and above and
- Women of all parities

4.4.2. EXCLUSION CRITERIA

- All registered women who had induction without full document.

4.5. SAMPLE SIZE DETERMINATION

The sample size for this study is determined by the following formula.

$$n = \frac{z_{\alpha/2}^2 P(1 - P)}{d^2}$$

Where: n = sample size

Z = standard normal distribution corresponding to significance level at $\alpha = 0.05$

p = proportion of labor induction success

“P”, proportion of labor induction success was assumed to be 62% which was derived from study conducted in Kenyatta National Hospital, Kenya. [21]

d = margin of error 5%

$$n = \frac{(1.96)^2 \times (0.62(1-0.62))}{(0.05)^2} = 362$$

By adding 10% of the non-response rate the final sample size is 362+ 10% of calculated sample which is 362+36 = 398.

4.6. SAMPLING TECHNIQUE

All women with induction of labor were registered among women who gave birth at St. Paul's Hospital Millennium Medical College from April 1st to June 30 2016 until the desired sample size was achieved.

4.7. DATA COLLECTION

Information regarding demographic features, details of induction of labor (indication, method, mode of delivery, complications, and neonatal outcome) was collected from the induction register and medical record files and entered in a predesigned form. Since there is no previous study in the study area and client record book was not complete to use questionnaire from study done in other areas, the question form was developed by using question form from other areas as base line and client documentation form prepared to be used all over the country.

4.8. STUDY VARIABLES

Dependent variable:

- Success of induction of labor

Independent variables:

- Demographic Factors** – Statistical characteristics of a population includes age, parity, gestation and marital status.

- ✚ **Socio-economic Factors** – Factors such as educational level, religion, ethnicity, and economic status that influence outcomes of induction of labor
- ✚ **Health indication for labor induction** – Are medical factors that necessitate termination of pregnancy by induction of labor. It is an independent variable that influences outcomes of induction of labor.
- ✚ **Obstetric history** (age, parity, gravidity, preterm delivery, 2nd-trimester loss), weight and current obstetric characteristics (gestational age, Bishop score, birth weight), indications and methods of induction.

4.9. OPERATIONAL DEFINITIONS

Induction of labor: - initiation of uterine contractions prior to its spontaneous onset after 28 weeks of gestation.

Failed induction of labor: - failure to achieve a vaginal delivery within 12hour after induction of labor was commenced.

Success of induction of labor: - when a woman had achieved vaginal birth within 12hour after induction of labor was started.

Non reassuring fetal heart pattern: Fetal heart either below or above normal range following induction of labor

Cervical ripening is the use of pharmacological or other means to soften, efface, or dilate the cervix to increase the likelihood of a vaginal delivery.

Tachysystole refers to > 5 contractions per 10-minute period averaged over 30 minutes. This is further subdivided into two categories, one with and one without fetal heart rate changes.

Hypertonus refers to excessive uterine contractions lasting > 120 seconds without FHR changes. This term should be abandoned and has been replaced in this guideline by tachysystole without FHR changes.

Hyperstimulation refers to excessive uterine contractions (tachysystole or hypertonus) with abnormal FHR changes.

4.10. DATA PROCESSING & ANALYSIS

After data collection, each questionnaire will be checked for completeness, consistency and clarity and was coded and then entered in to the prepared template and re checked for errors. Data was cleaned and explored for outliers, missed values and any inconsistencies and analyzed using SPSS version 20.

Descriptive statistics like frequency tables, graphs and descriptive summaries have been used to describe the study variables. Binary logistic regression analysis is used to assess the relative effect of determinants of success of induction of labor. Odds ratios (95% confidence intervals) is used to measure the magnitude of association of different factors with success of induction of labor.. A p-value < 0.05 was considered statistically significant in all tests of significance.

4.11. ETHICAL CONSIDERATION

Ethical clearance to conduct the study was obtained from St. Paul's Hospital Millennium Medical College, department of public health and permission to conduct the study in the department of obstetrics and gynecology was secured from the department. privacy will be ensured for the information by not recording the name of the respondent or other identifiers.

4.12. DISSEMINATION OF FINDINGS

The findings will be presented to the St. Paul's Hospital Millennium Medical College, department of public health. The findings will also be communicated to local health planners and other relevant stake holders the area to enable them take recommendations in to consideration during their planning process. Publication in peer reviewed, national or international journals will also be considered.

5. RESULTS

5.1 OBSTETRIC CONDITION OF THE MOTHER

Among the 398 women included in the study, 194 (48.7%) were induced with an indication of pre-eclampsia followed by 85 (21.4%) prolonged premature rupture of membrane. In other words, 300 (75.4%), 90 (22.6%), and 8 (2.0%) of the induction is due to medical complication, Premature rupture of membrane, and post term respectively. 64.1% of the gestational age ranged between 37 to 42 weeks. Out of the 398 whose chart was reviewed, 117 (29.4%) of them had rupture of membrane before the induction and 18 (4.5%) of them had foul smelling liquor and 34 (8.5%) of them had meconium stained amniotic fluid. 211 (53.0%) of the women had bishop score of 7 with the mean bishop score of 6.91. Regarding the method of induction used, all of them were induced with intravenous oxytocin. The total amount of intravenous oxytocin used was 15 units in 158 (39.7%) of the women followed by 10 units of oxytocin in 152 (38.2%) of the women. Among the 398 women who were included in this study, 73 (18.3%) of them had uterine hyper stimulation and 34 (8.5%) of the women had diastolic blood pressure greater than 90mmHg after induction.

Indication for the induction of labor in women at St. Paul's Hospital Millennium Medical College from April 1st to June 30, 2016.

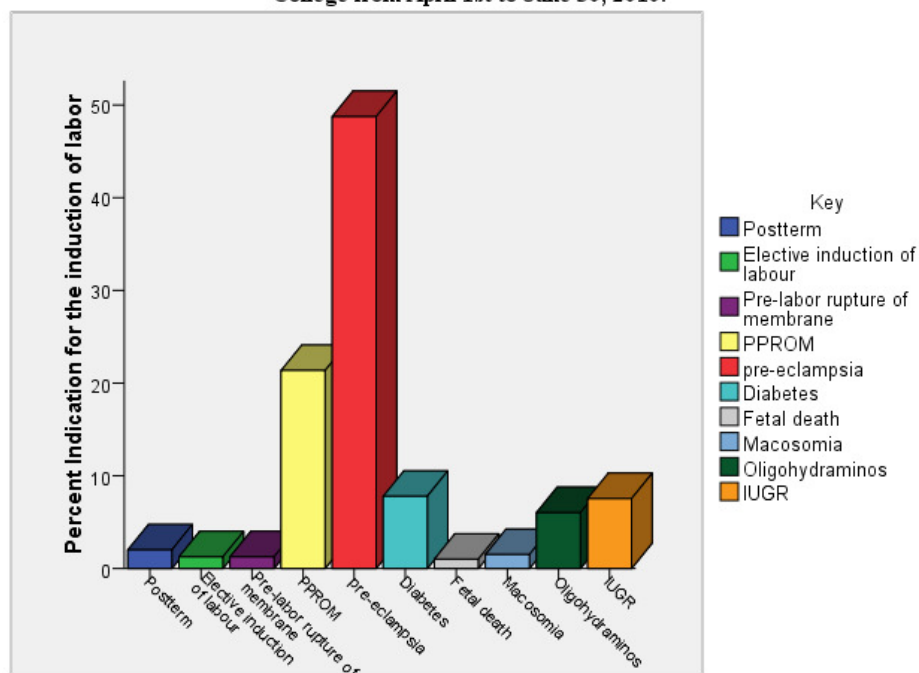
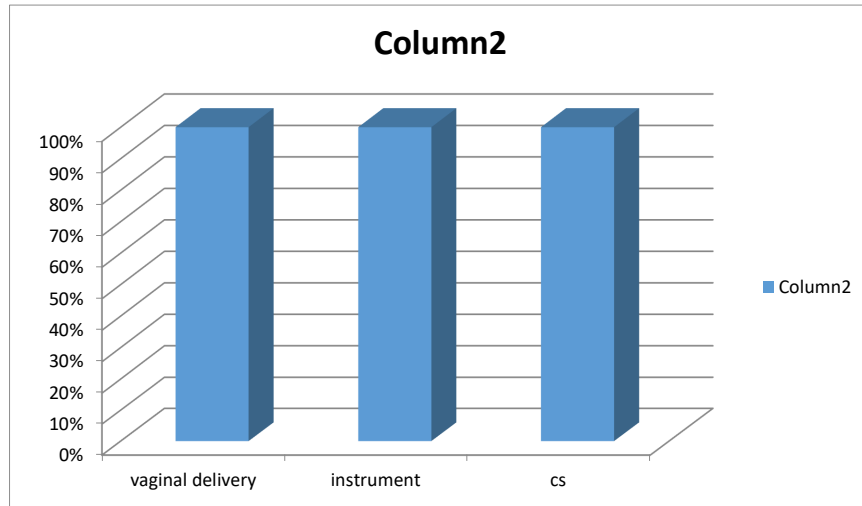


Figure 1. The indications of induction among women who was induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30.

Non reassuring fetal heart rate pattern was present in 116 (29.1%) of the women who were included this study. The time interval between start of induction and delivery was less than 8 hours in most 273 (68.6%) of the women. Spontaneous vaginal delivery 201 (50.5%), instrument assisted vaginal delivery 29 (7.3%), and cesarean section 168 (42.2%) were the mode of delivery after the induction of labor. Of the cesarean section deliveries, 82 (20.6%) were due to failed induction which means they failed to give birth vaginally, 73 (18.3%) were due to fetal distress,

and the rest were due to other obstetric complications. Of all the 398 induced women, 4 (1.0%) had uterine rupture.



Mode of delivery among women who was induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30.

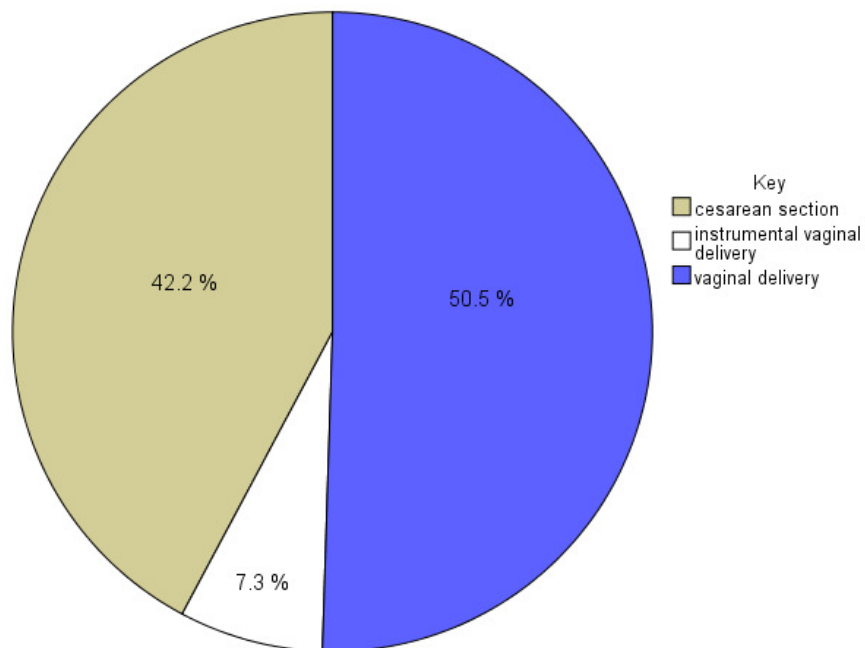


Figure 2. The mode of delivery among women who was induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30.

Characteristics	Frequency (N=398)	Percentage (%)
Indication of Induction		
Post term	8	2.0
PROM	90	22.6
Medical complications	300	75.4
Gestational age		
>=28-34 weeks	51	12.8
>=34-37 weeks	71	17.8
>=37-42 weeks	255	64.1
>=42 weeks	21	5.3
Rupture of membrane		
Yes	117	29.4
No	281	70.6
Foul smelling liquor		
Yes	18	4.5
No	373	93.7
Not recorded	7	1.8
Meconium staining		
Yes	34	8.5
No	364	91.5
Bishop score		
<=5	45	11.3
>6	353	88.7
Method of induction		
IV oxytocin	398	100
Total dose of oxytocin		
7.5 units	40	10.1

10.0 units	152	38.2
15.0 units	158	39.7
20.0 units	35	8.8
>20.0 units	13	3.3
Uterine hyper stimulation		
Yes	73	18.3
No	325	81.7
DBP>=90mmHg		
Yes	34	8.5
No	364	91.5
NRFHRP		
Yes	113	29.1
No	282	70.9
Time interval between induction and delivery		
<8 hours	273	68.6
8-12 hours	125	31.4
Mode of delivery		
Spontaneous vaginal delivery	201	50.5
Instrumental assisted vaginal delivery	29	7.3
Cesarean section	168	42.2
Uterine rupture		
Yes	4	1.0
No	394	99.0

Table 2. Obstetric related factors among women who were induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30, 2016.

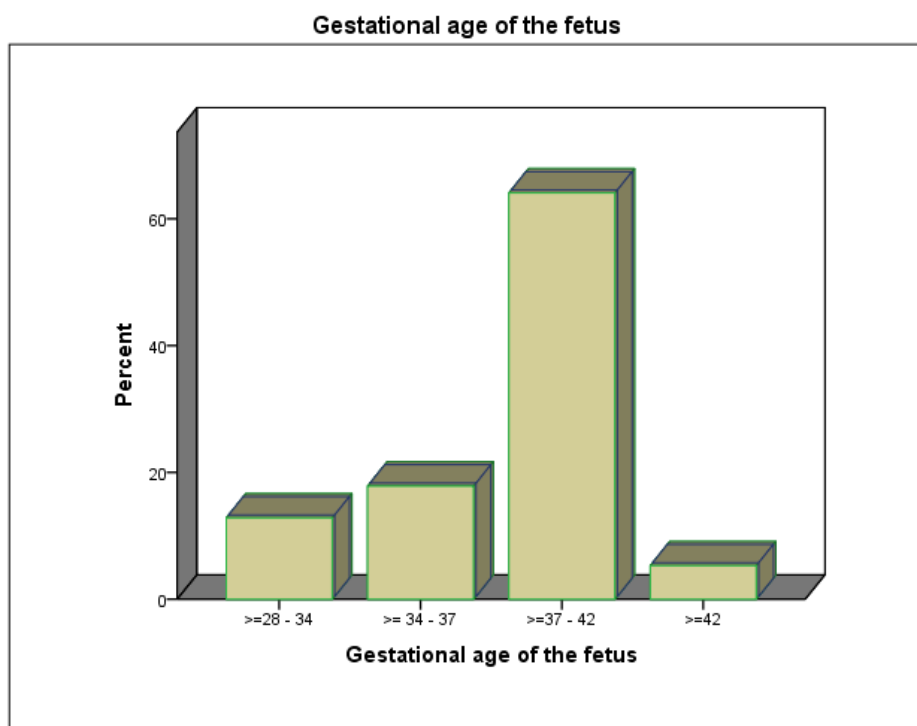


Figure 3. Gestational age of the fetus at which induction was opted among women who was induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30.

Induction of labor was considered successful when induction of labor ended up with vaginal delivery. Accordingly, as shown on the below diagram, 230 (57.8%) of the women undergone successful induction of labor while the rest 168 (42.2%) failed and undergone cesarean section.

Induction success rate among women who was induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30.

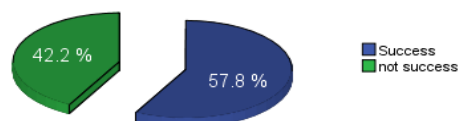


Figure 4. Outcome of induction among women who was induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30.

5.4. ASSOCIATION BETWEEN SELECTED FACTORS AND SUCCESS OF INDUCTION

In this study, the association of different factors of the participants with the success of induction was investigated using bivariable and multivariable binary logistic regression analysis.

Women who were induced with an indication of premature rupture of membrane were 0.375 times likely to experience successful induction [COR=0.375 (0.212 – 0.663)] with $p < 0.001$. Whereas women who were induced at the gestational age range 37- 41 were 1.6 times high likely to have successful induction compared to those who were induced after 42 weeks [COR=1.566 (1.566, 1.566)].

According to this research, women whose membrane ruptured before the start of induction experience successful induction 0.513 high likely than those who hadn't rupture of membrane before the induction [COR=0.487 (0.314 – 0.753)] with $p < 0.001$. Successful induction was more prevalent 0.8 times in those who were induced with 20.0 unit of intravenous oxytocin [COR=0.210 (0.077 – 0.575)] with $p < 0.002$. On the other hand, women who experienced uterine hyper stimulation had 2.4 times successful induction compared to those who didn't have uterine hyper stimulation [COR=2.377 (1.303 – 4.335)] with $p < 0.005$.

Women's whose fetus had non reassuring fetal heart rate pattern had 0.134 times less likely to experience successful induction [COR=0.134 (0.082 – 0.220)]. On the other hand, women who had meconium stained amniotic fluid are 6.15 times high likely to have successful induction [COR=6.15 (2.123 – 17.814)]. Success of induction is 1.626 more times prevalent in women whose induction of labor lasted ≤8 hours [COR=1.626 (1.061 – 2.492)] with p<0.026.

On multivariate regression, success of induction of labor is 5.279 times high likely in women who encountered uterine hyper stimulation compared to those who didn't encountered [AOR=5.279 (2.382 – 11.696)]. Women whose fetus had non reassuring fetal heart rate pattern were 0.080 times less likely to have successful induction [AOR=0.080 (0.041 – 0.158)]. On the other hand, women had short duration of induction of labor <8 hrs. are 0.431 times less likely to have successful induction of labor [AOR= 0.431 (0.229 – 0.810)]

Table 4. Factors associated with induction success rate among women who were induced at St. Paul's Hospital Millennium Medical College from April 1st to June 30, 2016.

Characteristics	Successful induction		COR (95% CI)	AOR (95% CI)
	Yes	no		
Indication for induction				
Post term	8 (100%)			0.516 (1.00)
PROM	32 (35.56%)	58 (64.44%)	0.319 (0.195, 0.522)	0.547 (0.299, 1.00)
Medical complications related to pregnancy	190 (63.33%)	110 (36.67%)		
Gestational Age				
≤41 week	209 (55.44%)	168 (44.56%)	4.229 (4.229)	
>41 weeks	21 (100%)		1.00 (1.00)	

Rupture of membrane				
Yes	53 (45.3%)	64 (54.7%)	0.487 (0.314, 0.753)	1.018 (0.576, 1.801)
No				
Total oxytocin used				
7.5 units	31 (77.5%)	9 (22.5%)	0.519 (0.154, 1.749)	0.962(0.235,3.941)
10.0 units	81 (53.3%)	71 (46.7%)	0.210 (0.077, 0.575)	0.555(0.179,1.721)
15.0 units	81 (51.3%)	77(48.7%)	0.175 (0.064, 0.479)	0.405 (0.133, 1.233)
20.0 units	30 (85.7%)	5(14.3%)	1.00 (1.00)	
Uterine hyper stimulation				
Yes	55(75.3%)	18(24.7%)	2.377 (1.303, 4.335)	5.279(2.382,11.696)
No	175 (53.85%)	150 (46.15%)	1.00 (1.00)	
Non reassuring fetal HR pattern				
Yes	(25%)	87(75%)	0.134 (0.082,	0.080(0.041,0.158)

			0.220)	
No	201(71.3%)	81(28.7%)	1.00 (1.00)	
Meconium stained fluid				
Yes	30 (88.24%)	4(11.76)	6.150 (2.123, 17.814)	
No	200 (54.95%)	164(45.05%)	1.00 (1.00)	
Duration of Induction				
<=8 hours	(61.54%)	105 (38.46%)	1.626 (1.061, 2.492)	0.431(0.229, 0.810)
>8 hours	62(49.6%)	63(50.4%)	1.00 (1.00)	

6. DISCUSSION

Induction of labor is one of the fastest growing medical procedures in current obstetric practice. In this study 57.8% of the women induced had successful induction while the rest 42.2% had failed induction. This is similar to a study done at Addis Ababa referral army hospital from 2011 to 2013, which showed 59.7% success of induction [13]. It was also similar with study done in Kathmandu Medical College Teaching Hospital, Nepal in which 65.38% undergone successful induction and study done in university clinics of Kinshasa, DR Congo in which 66.9% women had vaginal delivery so could successful induction [33, 34].

On the other hand, my study's result is lower than the research done at Jimma University specialized hospital in which the prevalence of successful induction was 88.7% (0121). In other way successful induction rate in these studies was lower than study conducted in King Khalid University Hospital, King Saud University, Riyadh, and Kingdom of Saudi Arabia from in which 84% of women had successful outcome of IOL [36]. Similarly, in study done in Aga Khan Hospital for women Karimabad, Pakistan, 81.9% of the case experienced vaginal delivery [35].

This discrepancy may be due to difference in quality of induction care provided by the hospitals. Similar to study done in Kathmandu Medical College Teaching Hospital, Nepal this study the main reason to undergone Caesarean sections was failed induction followed by fetal distress.

Various methods of induction have been recommended for induction of labor such as intracervical Foley balloons, prostaglandin E2, and IV oxytocin. In this study IV oxytocin was used exclusively to induce labor. This is in contrary with the study done in regional hospital of KwaZulu-Natal, South Africa where the most commonly used methods of IOL were oral

misoprostol (63.5%) and vaginal misoprostol (30.3%) [38] and the finding of the study done in health resource poor setting in Catholic Maternity Hospital in Ogoja, Nigeria indicated that use of misoprostol took the higher score 78.2% [37]. The reason for use of oxytocin as the most common method of induction of labor in the study area may be its better availability in the study settings or it may be due to the induction protocol of the facilities.

According to this study, the primary reason for induction of labor was medical complications related to pregnancy, the major cause being pre-eclampsia, followed by premature rupture of membrane (PROM). This is in contrary with a study done in Ain Shams University Maternity Hospital, Egypt (32 sara) in which premature rupture of membrane was the major cause of induction.

Premature rupture of membranes was also found to be the commonest indication for induction of labor in study done on unmet need for induction of labor in Africa [Sara18]. In other study done in Kingdom of Saudi Arabia post-term pregnancy was found to be the most common indication followed by diabetes mellitus (Sara 22). While the common indications for induction in Nepal study was post term pregnancy [Sara 23].

7. CONCLUSION AND RECOMMENDATION

7.1. CONCLUSION

Induction of labor is a lifesaving intervention aimed at preventing fetal and or maternal jeopardy which may arise in some conditions where further prolongation of pregnancy has become life threatening. An in depth knowledge of the dynamics of induction of labor is very important for safe obstetric practice.

- ⊙ The study reveals that three month prevalence of success of induction was good.
- ⊙ Premature rupture of membrane, non reassuring fetal heart pattern, women whose induction of labor lasted ≤ 8 hours have been identified as having significant association with success of induction

7.2. RECOMMENDATION

In this study, it was found that most of the charts were not complete. Therefore, its recommend the hospital health workers (Obstetricians, residents, interns, midwives, and nurses) participating in the induction of women should register full information and obstetric outcome of the mother and the fetus in the chart.

The hospital should have quality assurance programs and induction policies which is clear for the practitioners, including safety tools such as checklists, to ensure that inductions are performed for acceptable indications.

Future researches should be directed to conducting a multicenter study of similar objectives to provide national data set for evaluating and monitoring this important intervention and provide information for health services provision.

Even if most of the patients cards were available for the research some of the cards were missing therefore its recommended to have proper chart keeping.

8. LIMITATION AND STRENGTH OF THE STUDY

8.1. LIMITATION

The results of the study gave insight to the induction of labor services in one of the leading health institutions in Ethiopia. In addition, it provided information on the outcomes of a common obstetrical intervention. Such information is vital, considering the scarcity of the data on reproductive health and obstetrical practice in the country. However, there has been some limitation while doing this study;

1. The study was conducted in a small population in St. Paul's Hospital Millennium Medical College and the results may not be representative of the entire country.
2. The study was limited by the retrospective use of a database, allowing only the available variables to be used. In this particular hospital, for example, the women's general information on income, educational level, past obstetric history, and perinatal condition of the newborns were not properly registered. And the time frame of the study was only three months, from April 1st to June 30, 2016 due to economical limitation.
3. Selecting induced mothers were very difficult and it was a must to overview charts of all mothers who gave birth at St. Paul's Hospital Millennium Medical College in the time frame of the study.

8.2. STRENGTH

1. The data was collected by 4th year medical students who has been to the labor ward in their 3rd year clinical attachment.

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QUESTIONNAIRE

A questionnaire prepared to assess the prevalence and factors affecting the success of induction among women who attended induction at St. Paul's Hospital Millennium Medical College from 2014 to 2016.

Participant ID # _____ Date: _____

Please tick or enter in the appropriate space.

2. Induction of Labor

201. Date and Time induction commenced __/__/____

Didn't mentioned

202. Indication(s) for Induction

- 1) Post-term
- 2) Pre-labor rupture of membrane
- 3) Premature pre-labor rupture of membranes
- 4) Pre-eclampsia
- 5) Diabetes
- 6) Fetal death
- 7) Macrosomia
- 8) Oligohydramnios
- 9) IUGR
- 10) Elective Induction of labor
- 11) Others (specify) _____
- 12) Didn't record

203. Gestation age in weeks (indicate) _____

Didn't recorded

204. Membranes already ruptured before induction

- 1) Yes

- 2) No
- 3) Didn't recorded

205. Liquor foul smelling

- 1) Yes
- 2) No
- 3) Didn't recorded

206. Bishop's score _____

207. Method of induction (indicate)

- 1) Amniotomy
- 2) Intravenous oxytocin infusion
- 3) Complementary Methods
- 4) Didn't recorded

208. Total amount of oxytocin given

- 1) 5 unit
- 2) 10 unit
- 3) 15 unit
- 4) 20 unit
- 5) >20 unit
- 6) Didn't recorded

209. Uterine hyper stimulation present (as recorded in notes)

- 1) Yes
- 2) No
- 3) Didn't recorded

210. Non reassuring fetal heart rate pattern following induction of labor

- 1) Yes
- 2) No
- 3) Didn't recorded

211. Change of color of liquor to meconium stained

- 1) Yes
- 2) No
- 3) Didn't recorded

212. What was the approximate time the woman took between induction and delivery?

- 1) Below 8 hours
- 2) 8 to 12 hours
- 3) 13 to 24 hours
- 4) Above 24 hours

213. Mode of delivery

- 1) Vaginal delivery
- 2) Instrumental vaginal delivery
- 3) Caesarean section
- 4) Didn't recorded

214. If delivery by caesarean section, indication:

- 1) Failed induction of labor
- 2) Fetal distress
- 3) Cephalopelvic disproportion
- 4) malposition
- 5) Others indicate _____
- 6) Didn't recorded

215. Ruptured Uterus present

- 1) Yes
- 2) No
- 3) Didn't recorded