

The patterns and outcomes of induction of labour among pregnant mothers delivering at Hoima regional referral hospital, Hoima city Uganda

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ABSTRACT

IOL has had some undesired consequences, though it also registers several benefits for maternal and perinatal outcomes. This study aimed to assess the patterns and outcome of IOL among mothers who delivered in HRRH, in Hoima city in Hoima. A retrospective cross-sectional study was conducted from June 10 to June 20, 2019, among 126 mothers who gave birth between November 30, 2018, and May 30, 2019, by reviewing their cards using a structured checklist to assess the pattern, outcome, and consequences of induction of labor. A binary logistic regression analysis was computed to look for the association between outcome variables and independent variables. The most commonly reported cause of induction was hypertensive disorders (28.6%) followed by PROM (19.8%). The factors associated with IOL were mothers aged 20–34 years having no history of antenatal care and being primipara of the 126 induced mothers, (18.3%) had failed induction. The proportion of mothers with dead fetal outcomes and maternal complications was 11.1% and 30.1%, respectively. The unfavorable Bishop Score before induction was (66.7%) and induction using misoprostol (22.7%) were the factors associated with failed induction of labor. The rate of successful inductions (81.3%) was slightly higher than the rate of similar institutions in Uganda but comparable to the regional rates, while the rate of failed induction (18.3%) is slightly similar in comparison to both local and regional settings.

Keywords: Induction of labor (IOL), Maternal outcomes, Perinatal outcomes, Failed induction, Hypertensive disorders

INTRODUCTION

Induction of labor (IOL) is a clinical procedure designed to stimulate uterine contractions to facilitate the delivery of the fetus and placenta before the onset of spontaneous labor [1]. The primary objective is to achieve vaginal delivery when the benefits of induction outweigh the risks associated with continuing the pregnancy [2]. The World Health Organization (WHO) emphasizes that IOL should only be undertaken with a clear medical indication and when the potential benefits surpass the potential harms [3]. The global prevalence of IOL varies significantly. In developed countries, rates range between 20–25%, with some institutions reporting incidences as high as 40% [4]. Conversely, IOL prevalence in low-resource settings remains considerably lower, averaging 4.4% in Africa [5]. Within sub-Saharan Africa, IOL rates are particularly

low, with Uganda reporting a rate of 2.5% and Kenya 3.9%. These figures highlight a substantial unmet need for IOL in African settings, with estimates indicating that 60–80.2% of eligible women do not receive the procedure despite its potential benefits [6,7].

Indications for IOL are well-established and include post-term pregnancy, premature rupture of membranes (PROM), maternal medical conditions such as hypertensive disorders and diabetes, and fetal complications like intrauterine growth restriction (IUGR) and intrauterine fetal death [8]. Other conditions, such as chorioamnionitis, multiple pregnancies, and isoimmunization, are also recognized as valid reasons for induction [9]. IOL can be achieved using various methods, including pharmacologic approaches (e.g., oxytocin and

prostaglandins like misoprostol), mechanical techniques (e.g., balloon catheters), or amniotomy [10]. Among these, pharmacologic methods, particularly prostaglandins, are the most effective and widely recommended by the WHO for cervical ripening and labor induction [11]. While IOL often leads to successful vaginal delivery, it is not without risks [12]. Failed induction, defined as the inability to achieve the active phase of labor or vaginal delivery within 24 hours, poses significant challenges [13]. Factors contributing to failed IOL include an unfavorable Bishop score (≤ 6), indicating an unripe cervix, and the method used for induction [14]. Failed IOL is associated with increased risks of operative vaginal delivery, cesarean section, prolonged labor, uterine rupture, and adverse neonatal outcomes, such as severe birth asphyxia and NICU admission. Maternal complications, including intrapartum hemorrhage and endometritis, are also common [15]. Success rates for IOL depend largely on careful case selection and accurate assessment of cervical readiness. A Bishop score above six increases

the likelihood of vaginal delivery [16]. Despite the risks, IOL can lead to improved maternal and perinatal outcomes when compared to expectant management in women with clear indications for induction [17]. However, outcomes may vary widely based on local healthcare infrastructure, clinical expertise, and resources [18]. In Uganda and other African countries, IOL practices remain understudied, with limited data on patterns and outcomes. Most existing research focuses on success or failure rates rather than broader maternal and neonatal outcomes. At Hoima Regional Referral Hospital (HRRH), where IOL is a common practice, there is little information available regarding the specific patterns and results of the procedure. This study seeks to address this gap by examining the patterns and outcomes of IOL among pregnant women delivering at HRRH in Hoima City. Such research is critical to understanding the factors influencing the success or failure of IOL and improving maternal and perinatal healthcare services.

METHODOLOGY

Study Design

The study design was a retrospective cross sectional study design to determine the patterns and outcomes of induction of labour among pregnant mothers delivering at Hoima Regional Referral Hospital, Hoima City

Study Site

The study was conducted in HRRH, a public government owned facility which is found at about a distance of 200.4 KM from Kampala, the capital city of Uganda. It is found in Hoima City of Hoima District. The largest ethnic group of people in Hoima district are the Banyoro. Hoima district stretches at the West to the shores of Lake Albert and the border of the Democratic Republic of Congo. It's bordered from the North by Buliisa district, Northeast by Masindi district, East by Kyankwanzi district, and at the South by Kibaale and Ntoroko districts. HRRH has the obstetrics and gynaecology, the paediatric departments and among others departments. The department of obstetrics has a postnatal ward whereby mothers delivered vaginally and by caesarean section are admitted and it's here that the study will be conducted.

Study Population

This involved the review of files of the mothers who delivered at Hoima Regional Referral Hospital and were admitted in the postnatal ward.

Inclusion Criteria

The files that were reviewed were those of women who were delivered following induction of labour at

HRRH and who were above or completed 37 gestational weeks.

Exclusion criteria

The files that were excluded from the study were those of women very sick, incompletely filled and of those mothers who delivered without IOL

Estimation of the Sample

The sample size was estimated from a study conducted in Uganda that have shown that the prevalence of IOL which has been reported as 9% in Ethiopia [1]. Using modified Daniel's formula:

$$N = \frac{(Z)^2 xp(1 - p)}{(E)^2}$$

Where N = the sample size required

Z = Level of significance at 95% Confidence Interval (Z=1.96)

P = prevalence of EBF= 9% (=0.09).

E = Margin of error = 5% (Taken as 0.05)

$$N = \frac{(1.96)^2 x 0.09(1 - 0.09)}{(0.05)^2}$$

$$N = 3.8416 x 0.0819 / 0.0025$$

$$N = 126$$

Therefore, the required sample size for the study was 126 participants

Sampling Technique

The collection of data from admission files of participants was consecutive since the rates of IOL are low. The method was chosen to meet the required sample size.

Data Collection Instruments

The data collection instruments was a check list questionnaire which was designed to collect the information of women to answer the research questions.

Validity of Data Collection Instruments

The check list was pretested at Kiryandongo General Hospital to identify any source of errors that were corrected before data collection.

Data Collection Procedure

The previous participants' admission files were collected either from the postnatal ward or retrieved from the records office. The files of mothers who had undergone induction of labour were selected especially those that fulfilled the inclusion criteria. The required information or factors from the admission records that fulfilled the inclusion criteria were extracted and filled into the check lists designed to answer the research questions. The admission records that were not complete were eliminated. The completeness of the filled check lists was confirmed before returning the admission files to either the postnatal ward or records office.

Data Storage and Analysis

Data collected from the admission records was stored under lock and key only accessible to the principle investigator. Data from the check list was entered in Microsoft excel version 2010, then data from excel was imported into SPS. Baseline characteristic were summarized as means and medians (for continuous variables). Proportions, percentages and frequencies were used for categorical variables. The data was presented in forms of tables as appropriate. The measure of association was reported.

Quality Control

To ensure quality of the data collected, the selection criteria was adhered to strictly. The pretested check list was used for the data collection.

Socio-demographic and maternal factors.

The Ages of participants ranged from 14 to 43 years with mean age of (28.8 ± 5.0) years. They were 57 (32.4%) mothers from the rural areas while 69 (54.8%) were from urban areas. Most of the mothers 50 (40.0%) had attained secondary school education followed by 36 (28.5%) had primary education, most

Feasibility of the Study

Hoima Regional Referral Hospital receives an average of over 340 deliveries a month including the mothers who delivered after IOL though their outcomes are not well documented

Study Limitations and Delimitations

The sample size involved in this study is small because there is small proportion of mothers who are delivered following IOL. This small number is thought to represent the total number of women delivered following IOL at HRRH

Ethical Consideration

Informed consent, respect and risks to the respondents: an informed consent were requested from the hospital and records office to provide access to retrieve information from the admission files who delivered at HRRH. There are no imposed risks as this study is a retrospective involving collection of data from records of discharged mothers. The information collected from the patient files will be respected by keeping as secret only known by the principle investigation.

Benefits of the research and privacy: The study is to identify the different methods used for IOL and the outcomes and therefore, the community will benefit when the results of the study will be disseminated and recommendations implemented. Identification of participants' files was done by means of numerical codes. Details of respondents were kept under lock and key for privacy and confidentiality purposes throughout the course of the research. Selection of Participants: consecutive sampling method was used. Approval Procedure: Approval to carry out the study was sought from the faculty of clinical medicine of Kampala International University (KIU) Western campus which was presented to the medical superintendent of HRRH to give permission to the principal investigator to collect data at the hospital.

RESULTS

of the mothers were primipara 67 (53.4%) whereas 46 (36.6%) had a parity of 2-4.

Majority 120 (95.2%) of the mothers had at least had an ANC visit before time of induction and only 6(4.8%) of the mothers didn't go for ANC. Of the 126 mothers, 14 (11.1%) had dead fetuses at time of induction described as IUFD. All these is tabulated in table 1 below.

Table 1. showing the Socio-demographic and maternal factors

Variables	Categories	Frequency (N=126)	Percentage (%)
Age of mothers (years)	<20	15	11.9
	20-34	81	64.3
	≥35	30	23.8
Residence	Urban	69	54.8
	Rural	57	45.2
Level of education	None	25	19.5
	Primary	36	28.5
	Secondary	50	40.0
	Tertiary	15	12.0
	Para 1	67	53.4
Parity	Para 2-4	46	36.6
	Para 5 and above	13	10.0
	Yes	120	95.2
ANC follow up	No	6	4.8
Status of the fetus	Alive	112	88.9
	Dead	14	11.1

Pattern of Labor induction and Indication for IOL

Of the 126 mothers who were induced, of these, 36 (28.6%) for hypertensive disorders, 25 (19.8%) for PROM, and 22 (17.5%) for post-term pregnancy were the commonest reasons documented for induction of labor. As for the method of induction, 90 (71.2%) of

the women had been intravenously injected with oxytocin (Table 2). majority of the ladies had unfavorable 84 (66.7%) bishop score at time of induction.

Table 2. Showing the Pattern of Labor induction and Indication for IOL

Variables	Categories	Frequency (N=126)	Percent (%)
Pattern of labor induction	Mechanical	8	6.1
	Iv oxytocin	90	71.2
	Prostaglandins (misoprostol)	28	22.7
Indication for induction (n=60)	Hypertensive disorder	36	28.6
	APH	5	4.0
	PROM	25	19.8
	IUFD	14	11.1
	Oligohydramnios	14	11.1
	Post term	22	17.5
	Others	10	7.9
Bishop score before induction	Favourable	42	33.3
	Unfavourable	84	66.7

Outcomes of Labor Induction

Of the 126 mothers who were induced, 23 (18.3%) had failed induction [cesarean section (CS) delivers]. Majority of mothers delivered by spontaneous vaginal delivery 90 (71.4%), and 13 (10.3%) had instrumental delivery or assistance. The commonest maternal complication was postpartum hemorrhage accounted for 16 (12.7%), followed by 12 (9.5%) external genitalia tears of the induced mothers

(Tables 3 and4). Majority of the alive babies 103 (92.0%) scored APGAR >7 at 5minutes and majority were weighing 2.5-3.4kg 63 (56.3%) as in table 3. Only 28 (25.0%) the 112 live babies needed admission to NICU with PNA 14 (56%) being the commonest cause of admission followed by EONS 6 (24.0%) as in table 3 and table 4.

Table 3. Neonatal complications

Variable	Category	Frequency	Percentage (%)
Mode of delivery after induction n=126	Spontaneous vaginal delivery	90	71.4
	Instrumental delivery	13	10.3
	Caesarean section	23	18.3
Apgar score at 5minutes n=112	>7	103	92
	<7	19	8
Birth weight n=112	<2.5	18	16.1
	2.5-3.4	63	56.3
	>3.4	31	27.6
Admission to nicu n=112	Yes	28	25.0
	No	84	75.0
Reason for admission n=25	EONS	6	24.0
	PNA	14	56.0
	HMD	3	12.0
	MAS	2	8.0

Table 4 Maternal complications

Maternal complications	Yes n(%)	No n(%)
Precipitated labor	3(2.4)	123(97.6)
Placental abruption	5(4.0)	121(96.0)
Uterine rupture	2(1.6)	124(98.4)
External genitalia tears	12(9.5)	114(90.5)
Postpartum hemorrhage	16(12.7)	110(87.3)

DISCUSSION

Globally, IOL has seen a gradual upward trend irrespective of the medical conditions, and today, it is used in approximately 25% of all the pregnancies in the developed world. Characteristically, more than 70% of all expectant mothers, who underwent induction of labour, in this study, delivered babies without any complications. These findings are similar to what we observed in this study since there was a statistically significant association between induction of labour and improved fetal and maternal outcomes. It is therefore recommended that for cases that meet indications for induction of labour, the exercise should be practiced even in resource-poor settings. We also observed that 28 (18.3%) expectant mothers who underwent induction of labour ended up with Caesarean section or failed induction which is higher than the recommended Caesarean section rate of 10%-15% reported in the literature before [19]. A study done in Ethiopia revealed the prevalence of Caesarean section following induction of labour to have been 24% [1]. In our current study, the largest contributor

to increased Caesarean Section was the failure of induction noted during the study. Another study on maternal and newborn outcomes with induction reports a reduction of the caesarian section following induction 14.7%, operative vaginal birth is similar to our study [20].

Fetal outcomes were measured using Apgar scores and revealed another proof towards the beneficial effects of induction of labour to expectant mothers. The fact that about 92% of all induced mothers delivered babies with Apgar score ≥ 7 is evidence in favor of induction of labour even in resource-limited settings. This finding is comparable to Cochrane Pregnancy and Childbirth Group's findings, which that found induction of labour resulted in improved neonatal Apgar scores at 1st and 5th minutes respectively [19]. In the same Cochrane review, no significant differences between the rates of Apgar scores < 7 at 5 minutes (RR: 0.72, 95% C.I.: 0.44-1.18; 10 trials – 5379 women) [19].

In this study, we observed that postpartum hemorrhage was found in 16 (12.7%), whereas external genital tears were in 12 (9.5%) a finding

similar to a study carried out in Dar es salam, Tanzania.

CONCLUSION

The rate of successful inductions (81.3%) is slightly higher than the rate of similar institutions in Uganda but comparable to the regional rates, while the rate of failed induction (18.3%) is slightly similar in comparison to both local and regional settings. Like many local and regional Hospitals, hypertensive disorders and prolonged rupture of membranes were the most common indications for induction. Bishop's score after cervical ripening had better predictive value of successful induction.

Recommendations

Induction of labour improves and minimizes neonatal complications in referral regional hospitals in Uganda among which HRRH is no exception. Given the significant benefits of induction of labour observed in this study, healthcare workers in resource-limited settings should be encouraged to induce labour in

expectant mothers with established clinical indications. Furthermore, the selection criteria for induction of labour, need to be emphasized by all clinicians and decision-makers, to avoid failure of induction of labour, which may necessitate Caesarean Section. The Government of Uganda should increase the provision of better equipment and stock drugs for induction plus avail more health workers to increase the workforce in observing induced mothers. More funds to be allocated to regional referral hospitals, district hospitals and health centers to minimize rates of caesarean section Empower health workers with more knowledge concerning current trends in modern and recent guidelines for induction and possible increase the research in the field for much better health outcomes.

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