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Original Research Article

Factors for Failed Induction of Labour in Antenatal Women at Term

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Abstract:

Introduction: Failed induction of labor is a public health challenge associated with a higher rate of maternal and fetal morbidity as it increases rate of emergency cesarean section. This study was aimed to estimate proportion and risk factors of the failed induction of labor in Government Medical College, Kottayam

Objective: To estimate proportion and risk factors of failed induction of labour among women undergoing induction of labour at term.

Methods: A hospital based descriptive study in 232 term antenatal women who underwent induction of labour from January 2022 to December 2022 .A convinient sampling was used to collect data from medical records. Frequencies, proportions were used to describe the study population and Pearson's chi square test was used to identify factors contributing to failed induction of labour. P value of </=0.05 was taken as statistically significant.

Result: Proportion of failed induction of labour was 12.5%. Age >30 years, higher BMI, premature rupture of membrane, having pregnancy-induced hypertension, and Birth weight of greater than 4kg were risk factors. Combined method labour induction decreased failure rate.

Conclusion: Proportion of failed induction of labour was 12.5% was low compared to other studies. Age, BMI, premature-rupture of the membrane, pregnancy-induced hypertension, and method of induction were independent predictors for failed induction of labour. Combination method of induction and considering age, BMI while formulating induction protocol are highly recommended for reducing failed induction of labour.

Keywords: Failed induction, induction of labour, term, the outcome of induction, associated factors, Government Medical College Kottayam.

Introduction

Induction of labour (IOL) is artificial initiation of labour before its spontaneous onset, with or without ruptured membranes, indicated when the benefits to mother or foetus outweigh that of continuing pregnancy.[1]

Rate of induction of labour varies by location and institution.[2] Rate has doubled in the past decade from 10 to 20%. Unpublished data from the WHO Global survey on maternal and Perinatal Health, in 24 countries showed that 9.6% of the deliveries involved labour induction. African countries have lower rates of IOL (lowest: Nigeria, 1.4%) compared with Asian and Latin American countries (highest: Sri Lanka, 35.5%).[3]

Increase in this rate is related to a rise in the number of medical and obstetric indicated inductions, and elective inductions, the concern of the patients and healthcare providers about the possible risk of foetal demise with the expectant management.[4]

However induction fails in 20% of pregnancies.[1] There is no single global figure that indicates the magnitude of failed induction of labour, differs according to the induction guideline, and method used.[5] A secondary analysis of WHO on outcomes of Induction of labour in 16 Asian and African countries indicated average prevalence of failed induction 12.1% in Asia.[1] Failure of induction of labour poses 2 to 3 fold greater risk of mortality related to caesarean delivery compared to vaginal birth and health care expenses for delivery care services were higher for caesarean section.[6] Emergency caesarean delivery is associated with a higher rate of excessive blood loss, post-partum infection and maternal mortality.[4]

Universally, there is no standard definition for successful and failed IOL. Regarding IOL outcome, a variety of endpoints such as mode of delivery (vaginal delivery or caesarean section), have been suggested. As a consequence, comparison between published studies becomes difficult.[7] Most of the studies defined it as failure to achieve vaginal

delivery or to enter into active phase of labour after IOL.[2] The determinants of failed labour induction are not consistent across different health institutions. Several factors are associated with the success or failure of IOL to achieve vaginal delivery.[2] Therefore this study aimed to assess the proportion and risk factors of failed induction among term antenatal women who underwent induction of labour in Government Medical College Hospital, Kottayam.

Methodology

Study was conducted as hospital based descriptive study (retrospective analysis) among term antenatal women who underwent induction of labour in Department of Obstetrics and Gynecology, Govt. Medical College, Kottayam from January 2022 to December 2022.

Inclusion Criteria:

1. Single ton live intrauterine pregnancy
2. Longitudinal lie
3. Cephalic presentation
4. Gestational age 37 weeks and beyond
5. Modified bishop score 0-6

Exclusion Criteria:

1. Maternal age <18 years and > 40 years
2. Previous uterine surgery or previous classical Cesarean section
3. Low lying placenta
4. Preinduction fetal heart rate abnormalities
5. Active lower vaginal tract infections
6. Infertility treated pregnancy-short trail of labour
7. 1st degree Cephalo Pelvic Disproportion/ pelvic structural abnormalities
8. Cervical carcinoma

Sample Size

According to the study done by Demssie, Deybasso, Tulu, Abede on Failed induction of labor and associated factors in Adama Hospital Medical College, Ethiopia[3], done on 379 women, the proportion of failed induction was found to be 29.6% (95% confidence interval (25.2, 34.)

Required sample size is calculated with the formula

$N = 4pq/d^2$

P = 29.6%

Q = 100-P = 70.4

D = allowable error/precision taken as 20%

The sample size was calculated using formula;
$n=4pq/d^2$

Where "n" is the total sample size, p is the proportion of failed induction of labour taken from study conducted in which was 29.6%. "d" is allowable error/precision (arbitrarily chosen value) 20%. "q" is 100-p which is 70.4. The final sample size of 232 has been determined

Required sample size

$n = 4pq/d^2$

$= 4\times29.\times70.4/6\text{^}2$

$= 232$

Sample size = 232

Data Collection Tools

Medical case sheets, labour room register, emergency operation register and a validated semi structured questionnaire were used to collect relevant information from the study records.

Study Procedure

Convenient sampling technique was used to select study data. Information regarding obstetric characteristics, indications, methods of induction and information about outcome of induction of labour was collected by principal investigator by reviewing medical records and by using validated structured questionnaire developed by reviewing different literature until the required sample size was obtained.

All patients are admitted for induction of labor as inpatient. Induction of labor is done under necessary supervision, maternal and fetal monitoring and the progress of labor is documented in WHO Partogram

The induction procedure, dose and methods performed in Kerala varies from institution to institution. In our institution we follow Standared treatment guidelines Obstetrics KFOG, Ministry of health and family welfare Kerala and LaQshya Guidelines for induction[13] for antepartum, intrapartum and postpartum monitoring and care.
The preferred method of induction could be selected based on the indications or the health care provider's decision. Induction was started, by assessing cervical favourability using the Modified Bishop Score.

Data Management and Analysis

The data extracted from clinical record was checked, cleaned and coded and entered in Microsoft excel. Then analysis was done using suitable statistical software SPSS version 25. Qualitative variables will be expressed in frequency or proportion and quantitative variables will be expressed in terms of mean and standard deviation. Frequency tables, pie chart, and graphs will be used to display the results. To identify the association between each independent variable and the outcome variable Pearson's chi-square test was used. All variables having a p value of </= 0.05 in bivariate analysis was considered to be having a significant association.

Results

Risk factors for failed induction in antenatal women at term: From all predictor variables recruited in the bivariable logistic regression analysis, maternal age more than 30 years, higher BMI, premature ruptured membrane, PIH and Birth weight of greater than 4000gm were statistically associated with failed IOL.

The proportion of failed IOL was 12.5%. Out of 232, 203 (87.5%) had successful vaginal delivery along with CS for other indicactions and only 29 (12.5%) had failed induction of labour.

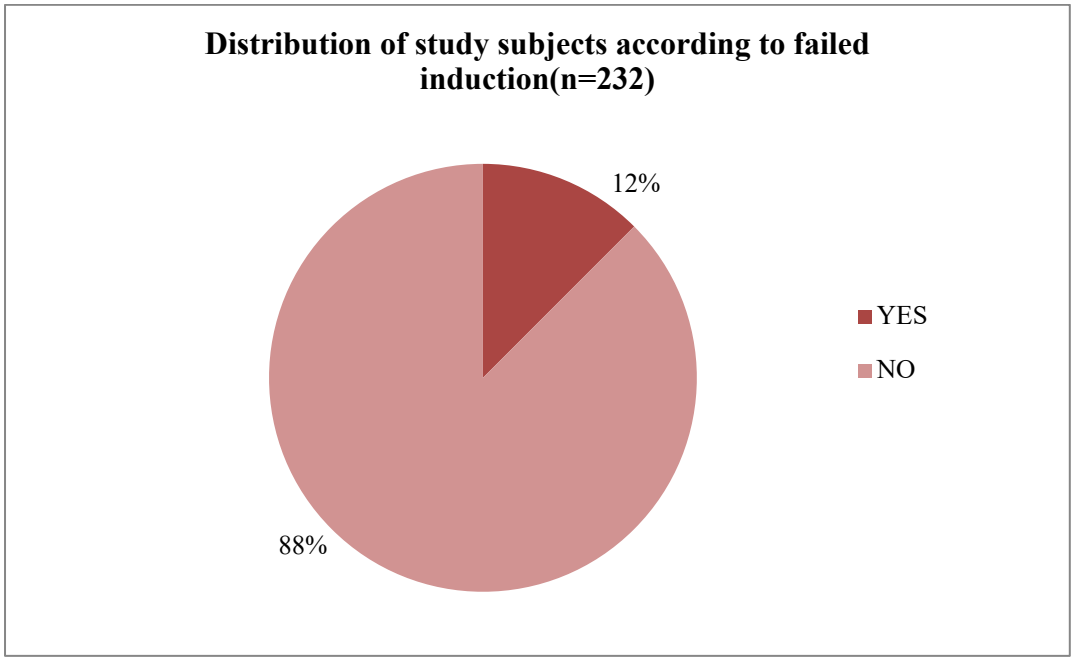

Figure 1: Distribution of study subjects according to failed induction

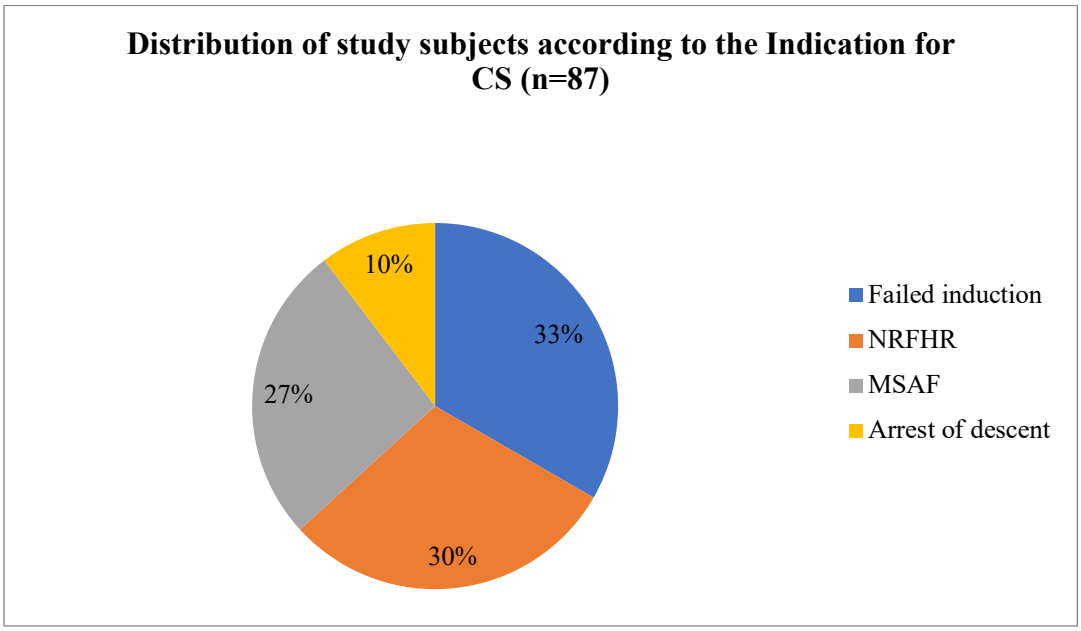

Figure 2: Distribution of study subjects according to the Indication for CS

Table 1: Age group and Failed induction

Age Group		Failed Induction		Total
		Yes	No	
< 20 years	Frequency	1	21	22
	Percentage	4.5%	95.5%	100.0%
20 - 30 years	Frequency	10	148	158

	Percentage	6.3%	93.7%	100.0%
> 30 years	Frequency	18	34	52
	Percentage	34.6%	65.4%	100.0%
Total	Frequency	29	203	232
	Percentage	12.5%	87.5%	100.0%

Chi square – 30.026, P value – 0.001. As age increases the proportion of failed induction also increases and it is statistically significant with a chi square value 30.6 and p value 0.001. Age >30 years had highest number of failed induction (34.6%) and lowest association was with age <20 years (4.5%)

Table 2: BMI and Failed Induction

BMI Group		**Failed Induction**		**Total**
		Yes	No	
Underweight	Frequency	1	19	20
	Percentage	5.0%	95.0%	100.0%
Normal	Frequency	3	75	78
	Percentage	3.8%	96.2%	100.0%
Overweight	Frequency	14	61	75
	Percentage	18.7%	81.3%	100.0%
Obese class 1	Frequency	11	48	59
	Percentage	18.6%	81.4%	100.0%
Total	Frequency	29	203	232
	Percentage	12.5%	87.5%	100.0%

Chi square – 11.01, P value – 0.012. The proportion of failed induction is higher in overweight 18.7% (14), when compared to normal BMI with overweight comprising. BMI has statistically significant association with failed induction with chi square value of 11.01 and p value of 0.012.

Table 3: Indication for Labour and Failed Induction

Indication for Induction of Labour		**Failed Induction**		**Total**
		Yes	No	
PIH	Frequency	8	40	48
	Percentage	16.7%	83.3%	100.0%
GDM	Frequency	5	34	39
	Percentage	12.8%	87.2%	100.0%
PROM	Frequency	9	23	32
	Percentage	28.1%	71.9%	100.0%
IUGR	Frequency	2	26	28
	Percentage	7.1%	92.9%	100.0%
Term	Frequency	1	58	59
	Percentage	1.7%	98.3%	100.0%
Decreased fetal movement	Frequency	2	8	10
	Percentage	20.0%	80.0%	100.0%
Oligohydramnios	Frequency	2	14	16
	Percentage	12.5%	87.5%	100.0%
Total	Frequency	29	203	232
	Percentage	12.5%	87.5%	100.0%

Chi square – 15.45, P value – 0.017. There was statistically significant association between indication for induction of labour and failed induction with chi square value 15.45 and p value 0.017. PROM was most common indication for induction of labour associated with failed induction (28.1%).

Table 4: Method of induction and Failed Induction

Method of induction		**Failed Induction**		**Total**
		Yes	**No**	
Stripping of membranes +EASI	Frequency	4	12	16
	Percentage	25.0%	75.0%	100.0%
PGE1(Misoprostol)	Frequency	8	39	47
	Percentage	17.0%	83.0%	100.0%
Oxytocin	Frequency	1	3	4
	Percentage	25.0%	75.0%	100.0%

EAS1+PGE1	Frequency	6	14	20
	Percentage	30.0%	70.0%	100.0%
EAS1+PGE1+Oxytocin +ARM (COMBINED)	Frequency	3	124	127
	Percentage	2.4%	97.6%	100.0%
EAS1+Oxytocin	Frequency	6	4	10
	Percentage	60.0%	40.0%	100.0%
PGE1+oxytocin	Frequency	1	7	8
	Percentage	12.5%	87.5%	100.0%
Total	Frequency	29	203	232
	Percentage	12.5%	87.5%	100.0%

Chi square – 41.89, P value – 0.001. Statistically significant association was seen between failed induction and method used for IOL with chi square value 41.89 and p value 0.001. EASI + oxytocin had more percentage of failed induction (60%). Combined method has least association with failed induction (2.4%).

Table 5: Birth Weight of Baby and Failed Induction

Birth Weight		**Failed Induction**		Total
		1.00	2.00	
< 2.5 kg	Frequency	8	59	67
	Percentage	11.9%	88.1%	100.0%
2.5 - 4 kg	Frequency	16	143	159
	Percentage	10.1%	89.9%	100.0%
> 4 kg	Frequency	5	1	6
	Percentage	83.3%	16.7%	100.0%
Total	Frequency	29	203	232
	Percentage	12.5%	87.5%	100.0%

Chi square – 28.4, P value – 0.001. Birth weight of newborn and failed induction has statistically significant association with chi square value 28.4 and p value 0.001. Birth weight >4kg is more associated with failed induction comprising 83.3%.

Discussion

In this study, the magnitude of failed IOL among women who underwent IOL in Government Medical College Kottayam was found to be 12.5%.This proportion was almost comparable with study conducted in Seongnamsi, Korea (14%)[1], was lower compared to previous studies in Odisha city of eastern India (50.5%)[8], Ethiopia 21.4% in Jimma University Hospital[9], Dessie referral Hospital (19.7%)[10], Hawassa public health facilities (17.3%), Ethiopia[11], three hospitals of Southwest Ethiopia (20.9%)[12], in Northwest Ethiopia (24.4%)[1]. Difference in the study setting like well-equipped CS facilities in developed countries which increase CS delivery for FIOL, variation in methods for IOL, majority of the study participants being multiparas and misoprostol/oxytocin alone was the predominant method for cervical ripening in other studies. Proportion of failed induction in our study was higher compared to Freret et al[13] (2.0%). The other possible justifications for differences in prevalence are because of the lack of a universally accepted definition of failed IOL, the time gap between study periods, the geographical setting of the study population, and the difference in the sample size of the studies, the nature of the study designs, and methods of data collection procedures. The lower prevalence observed in the current study is because mothers who delivered through the caesarean section for indications other than failed induction were excluded from the study.

Difference in IOL protocols and definitions makes it difficult to draw conclusions based on published studies like the lack of a generally accepted definition of failed IOL. Most studies define failed IOL as the impossibility to achieve a vaginal delivery, although there are many other factors appearing during labor that may affect vaginal delivery. Definition of failed IOL taken as, if regular uterine contractions, cervical changes do not occur after at least 12 hours of oxytocin administration (membranes ruptured) or after 24 hours of oxytocin if membranes unruptured. Most of the studies are based on a very general outcome, evaluating a final result such as the vaginal delivery, adding confounding factors.[14]

The most common indication for labour induction was elective/term induction (25.4%) in our study comparable to study conducted in Assam[15] were as it was PROM (46.4%)[16] in three hospitals of Southwest Ethiopia, in Northwest Ethiopia, (35.5%)[1] and in Mansoura University Hospital, and Dikirnis Hospital[17], it was post term pregnancy (51.28%) in study in Nepal.[18] Our study showed as the maternal age increases, the proportion of FIOL increase which may be because advanced maternal age increases complications like PIH and DM and myometrial contractility

decreases which can result in poor uterine contraction and the subsequently FIOL[1], supported by studies done in Hawassa, Ethiopia[11], Nepal[18], Australia[19], and Mansoura University Hospital, and Dikirnis Hospital.[21] Women with body mass index > 23 kg/m2 were more likely to have failed induction as compared to those with ≤23 kg/m2 as per our study. This finding is supported by findings in Southwest Ethiopia.[5] Maternal obesity is related with a lower bishop score, which increases failed induction.[20] Obese women require more concentration, higher doses, and longer duration of uterotonics, using similar protocol and guidelines on labor induction for all women with different BMI to end up with higher failure rate among obese women.[21]

Indication for induction was significant risk factor for failed induction, PROM being most common factor, followed by PIH in our study. This might be because PROM can affect the time given for labor induction, sufficient time may not be given to ripen the cervix or to achieve the active phase of labor due to fear of infection.[1] Ascending infection, can cause chorioamnionitis causing NRFHR exacerbate the risk of failed induction.[12] This finding is comparable with studies conducted in Ethiopia[17], Northwest Ethiopia[1] and Pakistan.[22] PIH was strongly associated with FIOL. The possible explanation might be the fact that Magnesium sulfate (MgSo4) given for the management of PIH (pre-eclampsia /eclampsia) is a known tocolytic drug[23] that can cause poor progress and arrest of labor and increased risk of uteroplacental insufficiency causing decreased response to uterotonic drugs and which may increase the failed IOL.[16] FIOL was less when combined method for IOL (EASI+PGE1+Oxytocin+ARM) was used compared to other methods as per our study. This might be because ARM initiates the release of endogens prostaglandin and increases the strength of uterine contraction.

In our study women whose newborn birth weight > 4000 g were more likely to have failed IOL compared to those with newborn birth weight 2500-3900 g. This study is supported by the previous studies[24], Southwest Ethiopia.[5] The mean birth weight of neonates were higher among women who had greater BMI[21], larger BMI leads to lower bishop scores, and FIOL. It can cause CPD, which leads to uterine dysfunction and difficult labor. This uterine inertia may increase the failure rate.[16]

Conclusion

In this study, of women who underwent induction, the proportion of failed IOL was 12.5%. Older maternal age, BMI, PROM, PIH, newborn birth weight >4 kg were among the variables, which increased the likelihood of FIOL. On the other hand, using combined method as a method of labor induction decreased the likelihood of FIOL.

A combination method of EASI+PGE1+ Oxytocin+ ARM is highly recommended for successful induction. No association was seen between parity, low preinduction Modified Bishop score, gestational age as risk factor for failed induction of labour. Close monitoring of maternal and fetal status before the initiation of IOL is also very crucial. Due consideration must be given to pre-induction conditions with the emphasis being placed on cervical status, and the specific method of IOL.

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