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EVALUATION OF THE CAUSES OF LABOR INDUCTION AND ASSOCIATED NEONATAL OUTCOMES IN INDIAN FEMALES

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ABSTRACT

Background: Labor induction is a procedure that is done artificially for initiation of the uterine contractions that cause the progressive effacement and dilatation of the cervix, causing the vaginal delivery. To carry out the labor induction, there should be a clear indication. The induction of labor is a challenge to fetuses, subjects, and obstetricians.

Aim: The present study aimed to assess the causes of labor induction and associated neonatal outcomes in Indian females.

Methods: The study assessed 752 subjects who underwent delivery at the institute, with 87 subjects where induction of labor was done. The method of induction of labor used in study subjects were sweeping of the membrane, oral mifepristone, only Dinoprostone gel, Dinoprostone gel, and Foley's catheter. The data gathered were analyzed statistically.

Results: The induction of labor in the study was done in 11.5% (n=87) subjects, with the majority of subjects aged 20-29 years with 83.90% (n=73) subjects. 43.67% (n=38) of subjects were primigravida, with the majority of study subjects in the gestational age of 37-40 weeks. Most of the subjects were induced for PROM and postdatism, with 28.7% (n=25) and 34.48% (n=30) subjects, respectively. The mean induction delivery time was 10-20 hours, with 82.75% (n=72) of subjects undergoing vaginal delivery. NICU was required by 14.9% (n=13) of study subjects.

Conclusion: The study concludes that induction of labor is beneficial and safe in high-risk pregnancies, with PROM and postdatism being the common indications for induction of labor and holding good perinatal outcomes. However, proper monitoring was needed to avoid potential complications.

Keywords: Induction of labor, labor, maternal outcomes, NICU, perinatal outcomes

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INTRODUCTION

Labor induction is a procedure that is done artificially for initiation of the uterine contractions that cause progressive effacement and dilatation of the cervix, causing vaginal delivery in the females.[1] Induction of the labor is usually carried out when the benefits of the fetus and mother overpower the risks when pregnancy is being carried forward. WHO (World Health Organization) recommends that induction of labor requires a clear medical indication and should be done only when the benefits overpower the risks and potential harms.[2]

Induction of labor is on the increase globally, including in India, with an increase in the trend that can cause an increase in the incidence of cesarean deliveries. The rate of the induction of labor ranges from 9% to 34%.[3] Recently, it has been noted that elective induction of labor is becoming a common practice where induction of labor is done in cases where it is not indicated by medical or obstetric concerns, which further contributes to an overall increase in the rates of induction. This can be attributed to the better ability to plan the delivery timings for the obstetricians, subjects, and their families.[4]

Previous literature data has depicted that delivery before 39 weeks of gestation with no medical indication is correlated to worse perinatal outcomes compared to delivery at the full term. Various literature studies have shown that induction of labor extended beyond 41 weeks shows variations from one country to another.[5]

Various methods for induction of labor have been tried in the literature, including mechanical and pharmacological methods. PGE1 (Misoprostol) is an inducing agent for labor, which is easier to store compared to PGE2, is more stable and is less expensive.[6] Another PGE2-inducing agent is Dinoprostone gel which increases the levels of collagenase and hyaluronidase in the cervix that can cause cervical softening.[7] The present study aimed to evaluate the causes of labor induction and associated neonatal outcomes in Indian females, along with the different indicators of the induction.

MATERIALS AND METHODS

The present prospective clinical study was done to evaluate the causes of labor induction and associated neonatal outcomes in Indian females, along with the different indicators of the induction. Informed consent was taken from all the subjects before study participation in both written and verbal format after explaining the detailed study procedure.

During the study interval, 752 deliveries were done where induction of labor was done in 87 subjects after the basic indications and requirements for the induction of labor were assessed. The subjects were finally included after selecting the inclusion and exclusion criteria and after signing the informed consent.

The inclusion criteria for the study were IUFD, PROM, oligohydramnios, fetal growth restriction, pre-eclampsia, and post-dated pregnancy. The exclusion criteria were subjects with contraindications for induction of labor and subjects that were not willing to participate in the present study.

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The various methods for induction of labor used in the present study were oral mifepristone, Foley catheter with gel, and Dinoprostone gel. In some subjects, stretching and sweeping of the membrane were also done. In 62 subjects, Dinoprostone gel was used for induction of labor in 82 subjects, and in 2 subjects, gel combined with Foley's catheter (intracervical) was used owing to lesser Bishop scores.

After the final inclusion of the study subjects, a pre-structured clinical proforma was made and filled with all the details. All the subjects were assessed in the labor room following the standard protocols of labor room monitoring. The subjects were monitored in the labor room with CTG, auscultation, and NST. Oral mifepristone was given, and Dinoprostone gel was inserted into the posterior fornix.

The data gathered were statistically analyzed, the results were formulated, and the statistical significance was kept at $p<0.05$.

RESULTS

The present prospective clinical study was done to evaluate the causes of labor induction and associated neonatal outcomes in Indian females, along with the different indicators of the induction. The study assessed 87 females undergoing delivery at the institute, with the majority of the study subjects in the age range of 20-29 years with 83.90% (n=73) subjects followed by 9.19% (n=8) subjects in >30 years of age, and least 6.89% (n=6) subjects in <19 years of age. In the majority of the study subjects, BMI was 25-30, depicting overweight subjects with 63.21% (n=55) subjects followed by normal weight subjects with <25 kg/m2 BMI in 25.28% (n=22) subjects, and least subjects had BMI of >30 kg/m2 considered obese with 11.49% (n=10) subjects. The majority of the study subjects were primigravida in 44.82% (n=39) subjects, followed by $2^{nd}/3^{rd}$ gravida in 41.37% (n=36) subjects, and 13.79% (n=12) subjects were $>4^{th}$ gravid. The majority of the subjects had a gestation period of 37-10 weeks in 56.32% (n=49) subjects followed by >40 weeks in 22.98% (n=20) subjects, and <37 weeks in 20.68% (n=18) study subjects, respectively as shown in Table 1.

For the induction of labor parameters in the study subjects, it was seen that the most common indication for induction of labor was postdatism in 35.63% (n=31) study subjects, followed by PROM in 28.73% (n=25) subjects, oligohydramnios in 22.98% (n=20), FGR in 13.79% (n=12), pre-eclampsia in 11.49% (n=10), others in 6.89% (n=6), IUFD in 3.44% (n=3), and eclampsia in 1.14% (n=1) study subjects respectively. The method for induction of labor was Foley's catheter in the majority of study subjects with 94.25% (n=82) study subjects, followed by the sweep and stretch in 2.29% (n=2) subjects, mifepristone, Foley's catheter with gel, and Dinoprostone gel in 1.14% (n=1) study subject each. The number of induction gels needed were 1, 2, and 3 in 52.87% (n=46), 28.73% (n=25), and 14.94% (n=13) study subjects, respectively, as depicted in Table 2.

Concerning the delivery parameters, it was noted that the induction-delivery interval was 10-20 hours in 41.37% (n=36) study subjects, followed by <10 hours in 39.08% (n=34) subjects, 21-30 hours in 14.94% (n=13) subjects, and >30 hours in 4.59% (n=4) study subjects. The most

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common delivery mode was LSCS in 82.75% (n=72) subjects and vaginal in 17.24% (n=15) subjects, and instrumental in no subject. The indication for LSCS was induction failure in 11.49% (n=10) subjects, fetal distress and not willing for further vaginal trial in 2.29% (n=2) study subjects, and deep, transverse arrest in 1.14% (n=1) subjects, respectively, as shown in Table 3.

For the neonatal outcomes, ICU (intensive care unit) was needed in 14.94% (n=13) study subjects and was not needed in 85.05% (n=74) study subjects (Table 4). The neonatal requiring ICU were from premature pregnancies, pre-eclampsia, or had PROM as a cause of infection which can cause hypoxia and the need for ventilation.

TABLES

Characteristics	Number (n)	Percentage (%)
Age range (years)		
<19	6	6.89
20-29	73	83.90
>30	8	9.19
BMI (kg/m2)		
<25 (Normal)	22	25.28
25-30 (Overweight)	55	63.21
>30 (Obese)	10	11.49
Obstetrics history		
Primigravida	39	44.82
$2^{nd}/3^{rd}$ gravida	36	41.37
$>4^{th}$ gravid	12	13.79
The gestation period (weeks)		
<37	18	20.68
37.1-40	49	56.32
>40	20	22.98

Table 1: Demographic and pregnancy characteristics of the study subjects

Labor Parameters	Number (n)	Percentage (%)
Indications		
Eclampsia	1	1.14
IUFD	3	3.44
Others	6	6.89
Pre-eclampsia	10	11.49
FGR	12	13.79
Oligohydramnios	20	22.98
PROM	25	28.73
Postdatism	31	35.63
Methods		
Foley's catheter	82	94.25
Sweep and stretch	2	2.29
Mifepristone	1	1.14

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Foley's catheter with gel	1	1.14
Dinoprostone gel	1	1.14
Number of induction gels needed (n=84)		
1	46	52.87
2	25	28.73
3	13	14.94

Table 2: Labor parameters in the study subjects

Delivery Parameters	Number (n=87)	Percentage (%)
Induction-Delivery interval (hours)		
<10	34	39.08
10-20	36	41.37
21-30	13	14.94
>30	4	4.59
Delivery mode		
LSCS	72	82.75
Instrumental	0	0
Vaginal	15	17.24
LSCS indication (n=15)		
Deep, transverse arrest	1	1.14
Not willing for vaginal trial	2	2.29
Fetal distress	2	2.29
Induction failure	10	11.49

Table 3: Delivery parameters in the study subjects

Neonatal outcomes	Number (n=87)	Percentage (%)
ICU needed	13	14.94
ICU not needed	74	85.05

Table 4: Neonatal outcomes in the study subjects

DISCUSSION

The present study assessed 87 females undergoing delivery at the institute, with the majority of the study subjects in the age range of 20-29 years, with 83.90% (n=73) subjects followed by 9.19% (n=8) subjects in >30 years of age, and least 6.89% (n=6) subjects in <19 years of age. In the majority of the study subjects, BMI was 25-30, depicting overweight subjects with 63.21% (n=55) subjects followed by normal weight subjects with <25 kg/m2 BMI in 25.28% (n=22) subjects, and least subjects had BMI of >30 kg/m2 considered obese with 11.49% (n=10) subjects. The majority of the study subjects were primigravida in 44.82% (n=39) subjects, followed by $2^{nd}/3^{rd}$ gravida in 41.37% (n=36) subjects, and 13.79% (n=12) subjects were $>4^{th}$ gravid. The majority of the subjects had a gestation period of 37-10 weeks in 56.32% (n=49) subjects followed by >40 weeks in 22.98% (n=20) subjects and <37 weeks in 20.68% (n=18) study subjects, respectively. These findings were similar to the studies of Dogi M et al.[8] in 2018 and Chawla S et al.[9] in 2017, where authors assessed subjects with demographic data similar to the present study.

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It was seen that for the induction of labor parameters in the study subjects, it was seen that the most common indication for induction of labor was postdatism in 35.63% (n=31) study subjects followed by PROM in 28.73% (n=25) subjects, oligohydramnios in 22.98% (n=20), FGR in 13.79% (n=12), pre-eclampsia in 11.49% (n=10), others in 6.89% (n=6), IUFD in 3.44% (n=3), and eclampsia in 1.14% (n=1) study subjects respectively. The method for induction of labor was Foley's catheter in the majority of study subjects with 94.25% (n=82) study subjects, followed by the sweep and stretch in 2.29% (n=2) subjects, mifepristone, Foley's catheter with gel, and Dinoprostone gel in 1.14% (n=1) study subject each. The number of induction gels needed was 1, 2, and 3 in 52.87% (n=46), 28.73% (n=25), and 14.94% (n=13) study subjects, respectively. These results were consistent with the previous studies of Keulen J et al. [10] in 2019 and Grobman WA et al. [11] in 2018, where authors reported postdatism as the most common cause for the induction of labor and Foley's catheter as the most common method for induction of labor as seen in the present study.

The study results showed that for the delivery parameters, it was noted that the induction-delivery interval was 10-20 hours in 41.37% (n=36) study subjects, followed by <10 hours in 39.08% (n=34) subjects, 21-30 hours in 14.94% (n=13) subjects, and >30 hours in 4.59% (n=4) study subjects. The most common delivery mode was LSCS in 82.75% (n=72) subjects and vaginal in 17.24% (n=15) subjects, and instrumental in no subject. The indication for LSCS was induction failure in 11.49% (n=10) subjects, fetal distress and not willing for further vaginal trial in 2.29% (n=2) study subjects, and deep, transverse arrest in 1.14% (n=1) subjects, respectively. These results were in agreement with the previous findings of Vogel JP et al. [12] in 2014 and Lawani OL et al. [13] in 2014, where authors reported pregnancy parameters comparable to the present study in the induction of labor cases seen in the present study.

The study results showed that for the neonatal outcomes, ICU (intensive care unit) was needed in 14.94% (n=13) study subjects and was not needed in 85.05% (n=74) study subjects. The neonatal requiring ICU were from premature pregnancies, pre-eclampsia, or had PROM as a cause of infection which can cause hypoxia and the need for ventilation. These results were in line with the previous studies of Abdulkadir Y et al. [14] in 2017 and Giugliano E et al. 15 in 2014, where ICU was needed by neonates born prematurely or due to PROM, as seen in the present study.

CONCLUSION

Considering its limitations, the present study concludes that induction of labor is beneficial and safe in high-risk pregnancies, with PROM and postdatism being the common indications for induction of labor and holding good perinatal outcomes. However, proper monitoring was needed to avoid potential complications. However, further longitudinal clinical studies are needed with a larger sample size to reach a definitive conclusion.

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