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Original Research Article

Factors influencing postdatism and fetomaternal outcomes in postdated pregnancies: a prospective study on spontaneous and induced labor

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ABSTRACT

Background: This study aimed to identify factors contributing to postdates and evaluate fetomaternal outcomes in postdated pregnancies undergoing spontaneous and induced labor.
Methods: This prospective study at Kasturba Hospital, Delhi (January-December 2023), involved 158 pregnant women beyond 40 weeks, divided into induction of labor (IOL) and spontaneous labor (SPOL) groups. Inclusion criteria included pregnancies beyond 40 weeks, confirmed gestational age, singleton cephalic presentation, and no complications. Maternal factors such as parity, demographics, BMI, and outcomes like mode of delivery, labor duration, and complications were recorded. Fetal outcomes, including APGAR scores and NICU admissions, were also analysed.
Results: Most participants were under 24 years old, with a mean BMI of 23.51±2.90 kg/m². Primigravida women made up 58.86% of the study population. Cesarean rates were higher in the IOL group (62.02%) than in the SPOL group (21.5%), with more postpartum hemorrhage in the IOL group (18.98% versus 3.79%). Fetal outcomes showed no significant differences, though meconium-stained amniotic fluid and NICU admissions were higher in the IOL group.
Conclusions: Primiparity, obesity, and a history of postdatism are significant factors associated with postdated pregnancies. While induction of labor is linked to higher cesarean rates and increased postpartum haemorrhage, fetal outcomes are similar to those in spontaneous labor. Individualized management and accurate gestational age estimation are essential. Further research is needed to optimize outcomes for postdated pregnancies.

Keywords: Induction of labor, Postdated pregnancy, Spontaneous labour

INTRODUCTION

The terms “postdate”, “post-term”, “post-maturity”, and “prolonged pregnancy” describe pregnancies that extend beyond the expected delivery date (EDD). The World Health Organization (WHO) and the International Federation of Gynaecology and Obstetrics (FIGO) define a postdated pregnancy as one surpassing 40 weeks.[1] In contrast, post-term is defined as 294 days or more. The American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) categorize deliveries from 37 weeks onward as: early term (37-38 weeks 6 days), full term (39-40 weeks 6 days), late-term (41-41 weeks 6 days), and post-term (42 weeks and beyond).[2]

Prolonged pregnancy, as defined by Fernandos Arias, refers to any pregnancy extending beyond the EDD. Accurate gestational age estimation, often using the last menstrual period (LMP) and early ultrasound, is crucial for managing postdated pregnancies.[3,4] Common risk factors include first-time pregnancies, previous prolonged pregnancies, male fetuses, obesity, hormonal factors, and genetics.[5]

Evidence shows increased risks for complications from 38-39 weeks onwards, with notable risks of labor difficulties, severe perineal injury, and higher cesarean rates. Perinatal mortality rates rise significantly after 42 weeks due to issues like uteroplacental insufficiency and meconium aspiration.[6] Fetal complications such as

macrosomia and neonatal acidemia are also more common.[7]

Management often involves induction of labor (IOL) if labor does not start spontaneously after the EDD, though IOL has varying success rates and risks. Concerns about induction include uterine hyper-stimulation and increased cesarean rates. Prolonged pregnancies also lead to higher healthcare costs due to frequent monitoring and potential induction.[8] Given the lack of a universal management protocol, further research is needed to refine treatment approaches and understand the causes of prolonged pregnancy.

METHODS

This prospective study was conducted at the department of obstetrics and gynaecology, Kasturba Hospital, Delhi, from January to December 2023. It involved 158 pregnant women divided into two groups: 79 undergoing induction of labor and 79 experiencing spontaneous labor.

Inclusion criteria

Inclusion criteria were a gestational age greater than 40 weeks, confirmed last menstrual period dates, a history of regular menstrual cycles, availability of a first-trimester ultrasound, singleton pregnancy, cephalic presentation, an unscarred uterus, and an uncomplicated pregnancy without gross congenital anomalies (GCA) in the fetus.

Exclusion criteria

Exclusion criteria were uncertain dates, irregular menstrual cycles, gestational age less than 40 weeks, cephalopelvic disproportion, previous caesarean or other uterine procedures, complications such as PIH, PE, DM, APH, malpresentation, malposition, oligohydramnios, polyhydramnios, presence of GCA, and maternal age over 40 years.

Maternal factors, including parity, demographics, BMI, and outcomes such as mode of delivery, labor duration, and complications, were recorded. Fetal outcomes, such as APGAR scores and NICU admissions, were also studied and analysed.

RESULTS

This study conducted a comprehensive demographic and obstetric profile analysis comparing two groups: induction of labour (IOL) and spontaneous labour (SPOL). The study revealed that most of the population was younger than 24 years, with 56.96% in this age group and no statistically significant age difference between the groups (p=0.63). Educational status was similar across both groups, with most participants having completed up to 12th grade (53.79%), and socioeconomic status predominantly categorized as lower (93.03%). BMI analysis indicated that 44.3% of participants in both groups fell within the obese category (BMI 25-29.99 kg/m²), with mean BMIs of 23.51±2.90 kg/m^2 and 23.57±2.85 kg/m^2 for IOL and SPOL groups, respectively (p=0.89). Parity distribution showed a significant portion of primigravida women (58.86%), and gestational age analysis revealed that 50.63% had a GA between 40-40+6 weeks, with no significant difference between the groups (p=0.37). Furthermore, 38.46% of multigravida patients had a history of postdatism, with no significant difference (p=0.82), and 13.29% reported a family history of postdatism (p=0.81).

Table 1: Factors responsible for postdatism.

Maternal factors (n=158)	Incidence	Percentage
Age (years)		
<24	90	56.96
25-30	61	38.6
29-35	5	3.16
>35	2	1.26
BMI in kg/m^2		
<22.9	59	37.34
23-24.99	29	18.35
25-29.99	70	44.3
Parity		
Primigravida	93	58.86
Multigravida (P1)	58	36.7
P2 and above	7	4.4
History of postdatism in previous pregnancy (n=65)	25	38.46
Family history of postdatism	21	13.29
Gender of baby		
Male	102	64.55
Female	56	35.44

The IOL group exhibited a higher incidence of hyperstimulation and tachysystole at 10.12%. Mode of the delivery analysis showed a higher rate of caesarean sections in the IOL group (62.02%) compared to the SPOL group, which had a higher rate of normal vaginal deliveries (67%), with these differences being statistically significant (p<0.001 for primigravida and p=0.02 for multigravida). Fetal distress was the leading indication for LSCS in both groups, with the IOL group also experiencing a notable rate of failed inductions (26.53%).

Table 2: Mode of delivery in IOL and SPOL group.

Mode of delivery	Induction of labour/IOL group (n=79) (%)	Spontaneous labour/SPOL group (n=79) (%)	P value
Primi (n= 93)			
Normal vaginal delivery (NVD)	5 (6.32)	27 (34.17)	<0.001
Lower segment caesarean section (LSCS)	37 (46.83)	14 (17.72)	
Instrumental delivery	5 (6.3)	5 (6.3)	
Multi (n= 65)			
Normal vaginal delivery (NVD)	17 (21.5)	26 (32.91)	0.02
Lower segment caesarean section (LSCS)	12 (15.18)	3 (3.79)	
Instrumental delivery	3 (3.79)	4(5.06)	

Table 3: Maternal outcomes with induced labour versus spontaneous labour.

Maternal outcomes	Induction of labour/IOL group (n=79)	Spontaneous labour/SPOL group (n=79)
Indication of LSCS		
Failed induction	13	0
Fetal distress	22	14
NPOL	8	1
Others	6	2
Maternal complications		
APH	2	1
PPH	15	3
Oligo	12	14
PUT	3	2
Perineal injury	4	3
Shoulder dystocia	3	3
Cord prolapse	1	1

The data revealed notable differences and similarities in this comparative study of maternal and fetal outcomes between induction of labour (IOL) and spontaneous labour (SPOL) groups. A significant disparity was observed in postpartum hemorrhage (PPH) rates, which were higher in the IOL group (18.98%) compared to the SPOL group (3.79%), with a p value of less than 0.01, indicating statistical significance. Other maternal complications, including antepartum haemorrhage (APH), oligohydramnios, periurethral tears, perineal injury, shoulder dystocia, cord prolapse, and uterine rupture, showed no significant differences between the groups. Fetal outcomes, such as APGAR scores, NICU admissions, and perinatal mortality, were similar across both groups, with no statistically significant differences. The average birth weight was comparable, with a mean of 2.74±0.46 kg in the IOL group and 2.75±0.60 kg in the SPOL group. Gender distribution showed no significant difference, with a higher proportion of male births overall. These findings highlight a significant difference in PPH rates, though comparable outcomes for other maternal and fetal complications between the two groups.

Table 4: Fetal outcomes with induced labour versus spontaneous labour.

Fetal outcomes	Induction of labour/IOL group (n=79)	Spontaneous labour/SPOL group (n=79)
Birth weight		
<2.5 kg	15	20
2.5-4 kg	63	56
>4 kg(macrosomia)	1	3
Mean birth weight in kg	2.74±0.46	2.75±0.60
Mean APGAR at 1 minute	7.76±0.73	7.42±1.10
Mean APGAR at 5 minutes	8.82±0.52	8.75±1.08
Fetal complications		
FGR	8	7
MSL	12	9
MAS	2	3
Birth Asphyxia	4	4
APGAR <7 at 1 minute	5	4
APGAR <7 at 5 minutes	0	1
NICU admission	5	3
Perinatal mortality	1	1

DISCUSSION

In this study, the age distribution revealed that the majority of participants were under 24 years old, with 56.96% in this age group. The IOL group had 51.89%, and the SPOL group had 62.02% under 24 years, and the mean ages were 25.0±3.65 years for the IOL group and 24.14±3.55 years for the SPOL group, showing no statistically significant difference (p=0.13). This aligns with findings from Chhabra et al and Keulen et al that younger age groups are prevalent in studies on prolonged pregnancies.[9,10] Socioeconomically, the majority of participants were classified as having a "lower" socioeconomic status, with 93.67% in the IOL group and 92.4% in the SPOL group, similar to the distributions reported by Keulen et al.[10]

The study also observed that there were more male babies (64.55%) born than female (35.44%) babies, corroborating findings by Michael Divon et al that reported more male deliveries in gestational age >41 weeks.[5] The mean BMI was 23.51±2.90 kg/m^2 in the IOL group and 23.57±2.85 kg/m^2 in the SPOL group, with a high prevalence of obesity (BMI≥25 kg/m^2), aligning with studies from Roos et al and Thangarajah et al which indicated an association between higher BMI and postdatism.[11,12] Obstetric history showed that 58.86% of participants were primigravida, with slightly more multigravida in the SPOL group, consistent with Chhabra et al and Roos et al that highlighted primigravida prevalence in prolonged pregnancies.[9,11] Gestational age distributions were comparable, with 55.69% of the IOL group and 45.56% of the SPOL group having GA between 40 and 40+6 weeks, similar to findings from Thangarajah et al.[12]

Regarding the history of postdatism, 38.46% of multigravida patients had a previous postdated pregnancy, showing no significant difference between groups (p=0.82), consistent with Kortekaas et al and Anand et al.[13,14] Family history of postdatism was present in 13.29%, with no significant difference between groups (p=0.81), aligning with Mogren et al which indicated a modest familial influence.[15] Mode of delivery showed higher cesarean section rates in the IOL group (62.02%) compared to the SPOL group (21.5%), with higher normal vaginal delivery (NVD) rates in the SPOL group (67% versus 27.8%), supported by Thangarajah et al and Ferdaushi et al.[12,16] The primary indication for lower segment cesarean section (LSCS) was fetal distress, higher in the SPOL Group, consistent with Thangarajah et al and Botcha et al.[12,17]

Finally, maternal complications showed a higher incidence of postpartum haemorrhage (PPH) in the IOL group (18.98% versus 3.79% in SPOL), while other complications like perineal injuries and oligohydramnios had comparable rates between groups. These findings align with Thangarajah et al and Pransukhbhai et al, indicating increased complications in the IOL group.[12,18]

Our study found several notable differences in fetal complications between the IOL and SPOL groups. The incidence of meconium-stained amniotic fluid was higher in the IOL group (27.84%) compared to the SPOL group (18.3%), consistent with findings from studies by Thangarajah et al and Pransukhbhai et al which reported increased meconium staining in induced labor.[12,18] Neonatal intensive care unit (NICU) admissions were significantly higher in the IOL group at 20.25%, compared to 10.85% in the SPOL group, aligning with results from Ferdaushi et al who noted higher NICU admissions in induction cases.[16] Birth asphyxia was also more frequent in the IOL group (12.03%) than in the SPOL group (6.35%), reflecting findings by Botcha et al that indicated an association between induction and increased birth asphyxia rates.[17]

Additionally, the incidence of low Apgar scores at 5 minutes was higher in the IOL group (15.18%) compared to the SPOL group (7.59%), which is in agreement with study by Thangarajah et al.[12] There were no significant differences in other fetal complications such as neonatal sepsis and jaundice between the groups, which is consistent with the findings from Roos et al and Kortekaas et al.[11,13] Overall, our study's findings are aligned with existing literature, indicating that induction of labor is associated with higher rates of certain fetal complications compared to spontaneous onset of labor while incidence of other complications remain similar.

This study's limitations include being single-centre, which limits generalizability, and a limited sample size that may reduce statistical power for subgroups. The socioeconomic homogeneity and exclusion of high-risk pregnancies may introduce bias. Additionally, reliance on self-reported data risks recalls bias, and long-term neonatal outcomes were not tracked.

CONCLUSION

This study significantly advances the understanding of postdated pregnancy by identifying and studying key demographic and clinical factors such as primiparity, obesity, and fetal gender as influential contributors to postdatism. It offers a comprehensive comparison between spontaneous and induced labor in postdated pregnancies, highlighting that induction is linked to higher rates of cesarean sections, increased postpartum haemorrhage while still resulting in better APGAR scores at 5 minutes. These findings emphasize the necessity for personalized management strategies, where accurate diagnosis, close fetal monitoring, and clear patient counselling are paramount- especially in low- and middle-income settings where patient compliance is a huge challenge. The research underscores that while induction of labor is a critical intervention in postdated pregnancy, it comes with heightened risks, requiring careful implementation alongside access to emergency interventions. This study contributes valuable insights to the field by advocating for individualized, cautious, and well-monitored management of postdated pregnancies, balancing the benefits and risks of labor induction. It also paves the way for further large-scale, multicentre studies to enhance clinical protocols and improve maternal and neonatal outcomes globally.

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