Dr. Peter Abiye Awoyesuku
Department of Obstetrics and Gynaecology, Rivers State University teaching hospital, 6-8 Harley Street, old G. R. A, Port-Harcourt, Nigeria

Dr. Chinweowa Ohaka
Department of Obstetrics and Gynaecology, Rivers State University teaching hospital, 6-8 Harley Street, old G. R. A, Port-Harcourt, Nigeria

Dr. Simeon Chijioke Amadi
Department of Obstetrics and Gynaecology, Rivers State University teaching hospital, 6-8 Harley Street, old G. R. A, Port-Harcourt, Nigeria

Dr. Basil Omieibi Altraide
Department of Obstetrics and Gynaecology, Rivers State University teaching hospital, 6-8 Harley Street, old G. R. A, Port-Harcourt, Nigeria

Dr. Bapakaye Ngeri
Department of Obstetrics and Gynaecology, Rivers State University teaching hospital, 6-8 Harley Street, old G. R. A, Port-Harcourt, Nigeria

Dr. Rose Sitonma Iwo-Amah
Department of Obstetrics and Gynaecology, Rivers State University teaching hospital, 6-8 Harley Street, old G. R. A, Port-Harcourt, Nigeria

Corresponding Author:
Dr. Peter Abiye Awoyesuku
Department of Obstetrics and Gynaecology, Rivers State University teaching hospital, 6-8 Harley Street, old G. R. A, Port-Harcourt, Nigeria

Maternal and fetal outcomes of pregnancies beyond 40 weeks of gestation at a tertiary care hospital in Port Harcourt, Nigeria

Dr. Peter Abiye Awoyesuku, Dr. Chinweowa Ohaka, Dr. Simeon Chijioke Amadi, Dr. Basil Omieibi Altraide, Dr. Bapakaye Ngeri and Dr. Rose Sitonma Iwo-Amah

Abstract
Background: Pregnancy beyond 40 weeks is a frequent dilemma faced by obstetricians as the risk to the mother and the fetus increases with advancing gestational age. This risk becomes more evident as the pregnancy goes beyond 42 weeks.
Objective: This study aimed to determine the prevalence of postdate pregnancy and to evaluate the maternal and fetal outcomes at a tertiary care hospital.
Methods: A retrospective study was conducted over a two-year period from 1st May 2021 to 30th April 2023. The study population were women who were delivered after 40 weeks of gestation. Information was extracted from the hospital records using a proforma. Data were analyzed with SPSS for Windows version 23 and presented using frequency tables, as number and percentages. Statistical analysis was performed using the Chi-square test or Fisher's exact test as appropriate, and the level of significance was set at P value of 0.05. Independent variables were analyzed using bivariate analysis, and the variables with an association were fitted into a multivariate logistic regression analysis.
Results: The prevalence of postdate pregnancy was 9.0%. Vaginal delivery occurred in 53.2% whereas 46.8% required caesarean delivery, the most common indication being cephalopelvic disproportion 53.1%, and the proportion increased with increase in gestational age. The stillbirth rate was 3.2% and the perinatal asphyxia rate was 7.6%, both increased with increasing gestational age. The gestational age ≥42 weeks was associated with a four-fold increased risk of caesarean delivery and seven-fold increased risk of stillbirth.
Conclusion: Postdate pregnancy was significantly associated with poor maternal outcome in the form of increased caesarean delivery rates, primarily due to cephalopelvic disproportion and fetal distress. Perinatal mortality was high, and fetal complications, especially perinatal asphyxia resulted in higher rate of admission to neonatal intensive care unit.

Keywords: Postdate, post-term, prolonged pregnancy, maternal outcome, fetal outcome

Introduction

Postdate pregnancy is one that extends beyond 40 weeks of gestation or 280 days from the day of the last menstrual period (LMP), or beyond the estimated delivery date (EDD), and has an incidence of 4-14% [1, 3]. The term post-term or prolonged pregnancy refers to one that extends to or beyond 42 weeks or 294 days. Postdate, post-maturity, post-term and prolonged pregnancy are accepted terms by the International Federation of Gynecology and Obstetrics (FIGO) and the World Health Organization (WHO), and are associated with increased obstetric intervention, and maternal and fetal morbidity [2, 4, 5].

The exact aetiology of accurate prolonged pregnancy is not fully understood. It is believed to have a multifactorial pathogenesis, with racial/hereditary factors, low vaginal fetal fibronectin levels, central nervous system abnormalities (such as anencephaly), variations in corticotropin-releasing hormone, and sociodemographic factors like living standards, said to be contributory [1]. Maternal age, nulliparity, obesity, genetics, previous history of postdate pregnancy, and male fetus, are recognized risk factors [6, 7].

Inaccurate dating of pregnancy is often the reason for inaccurate prolonged pregnancy diagnosis [8, 9]. Pregnancy dating using the LMP in sub-Saharan Africa is still used to estimate the EDD and may be inaccurate or inconsistent due to recall bias, irregular cycles, prior use of hormonal

contraceptives and early pregnancy bleeding [10]. Ultrasound scan estimation of gestational age in early pregnancy can be used to enhance the accuracy of the EDD, but there are limitations in later gestational ages [9].

The combined effects of continued fetal growth and arrested placental growth (or ischaemic placenta) might lead to increased risk to the fetus, mainly due to increasing weight (macrosomia) and oligohydramnios which increases the chance of cord compression and meconium aspiration, and a decline in placental function with compromised fetal circulation eventually leading to fetal distress and death [11, 12]. The stillbirth risk increases beyond 40 weeks of gestation, with twofold increase at 42 weeks, increasing to fourfold at 43 weeks and five-sevenfold at 44 weeks [11, 13, 16].

The maternal complications of postdate pregnancy include increased rate of dystocia, maternal birth laceration and operative vaginal delivery due to a large baby. There is also an increased rate of caesarean delivery (CD) and increased risk for infection, wound complications, and postpartum haemorrhage [5]. In view of these adverse complications that can occur in the mother and fetus, the Royal College of Obstetricians and Gynaecologists (RCOG) and the WHO guidelines recommend that women should be offered induction of labour after 41 weeks [17, 18]. Those who decline should be offered expectant management with increased antenatal monitoring and induction at the 43rd week [19, 20]. Studies have demonstrated that elective induction of labour between 40-41 weeks of gestation in low-risk women have resulted in lower CD rates and more favourable fetal outcomes than expectant management [21-23]. However, in one randomized trial, there were no differences in neonatal morbidity, mode of delivery, and general outcomes between induced labour at 41 weeks or spontaneous follow-up until 42 weeks in women with unfavourable cervical scores [24].

This study aimed to determine the incidence of postdate pregnancy, evaluate the maternal and fetal complications, and to identify its associated factors at a tertiary care hospital in Port Harcourt, Nigeria. The findings will enable safe and timely induction of labour, minimizing severe maternal and fetal complications.

Methods
Study Site / Area
This study was carried out at the obstetric wards of the Rivers State University Teaching Hospital (RSUTH) Port Harcourt, Nigeria. The hospital serves as a referral center and provides antenatal care and delivery services for women registered with the hospital. The hospital has qualified teams of Obstetricians, Paediatricians and Anaesthetists, and availability of blood bank services. There is an average annual delivery of about 1700 births.

Study design and population
A retrospective study was conducted over a two-year period from 1st May 2021 to 30th April 2023. The study population were women who were delivered after 40 weeks of gestation at the RSUTH. The inclusion criteria were uncomplicated singleton pregnancy with vertex presentation and pregnancy dated from known last menstrual period or first/early-second trimester ultrasound scan report. Those with previous caesarean scar, congenital anomalies in the fetus, non-vertex presentation, multiple pregnancy, any other pregnancy complication (antepartum haemorrhage, prolonged rupture of membranes, diabetes, heart or renal disease, and chronic/pregnancy-induced hypertension), and incomplete data were excluded.

Data collection
Information was extracted from the hospital records and case notes of the patients using a proforma. Data regarding maternal demographic factors like age, parity, booking status, and gestational age were retrieved. Maternal outcomes in terms of mode of delivery, indication for CD, postpartum haemorrhage (PPH), vaginal birth trauma, and wound infection; as well as fetal outcomes in terms of sex, birth weight, perinatal asphyxia (Apgar scores at 5 minutes <7), admission to Neonatal Intensive Care Unit (NICU), and perinatal mortality were noted. The gestational age at delivery was categorized into 40 weeks (40 completed weeks up to +6 days), 41 weeks (41 completed weeks up to +6 days) and ≥42 weeks for further analysis.

Clinical practice
The approach to management of prolonged pregnancy in our obstetric unit is to induce labour at 41 weeks, where expectant management and fetal surveillance fail to result in spontaneous labour before then. Irrespective, the target is to deliver the women before 42 completed weeks, when booked in our hospital. Cervical ripening and induction of labour is carried out using vaginal Misoprostol or intracervical extra-amniotic Foley's balloon catheter. Labour in such cases is accorded extra intrapartum care and monitoring. The decision for instrumental vaginal delivery or caesarean section was taken by a senior obstetrician, according to the fetal heart rate and progress of labour. The baby was attended to by the paediatrician after delivery.

Statistical analysis
Data were checked, coded, and analyzed with SPSS (Statistical Package for Social Sciences) for Windows version 23 (SPSS Inc., Chicago, Illinois, USA). The data were presented using frequency tables, as number and percentages. Statistical analysis was performed using the Chi-square test or Fisher's exact test as appropriate, and the level of significance was set at P value of 0.05. Independent variables were analyzed using bivariate analysis, and the variables with an association were fitted into a multivariate logistic regression analysis.

Results
There was a total of 3482 deliveries during the two-year study period out of which 314 were uncomplicated postdate pregnancies, giving a prevalence of 9.0%. The mean age of the study population ± standard deviation (SD) was 30.20±5.11 years, with a median of 30 years and age range of 16-43 years. The median parity was Para 1 and range was Para 0-5. The mean gestational age of the study population ± SD was 40.47±0.71 weeks, with median of 40 weeks and range of 40- 43 weeks.

Table 1 shows the distribution of the maternal and obstetric characteristics of the women. The majority 166 (52.8%) were aged between 21-30 years, followed by 134 (42.7%) women aged between 31-40 years. The parity before delivery in 137(43.6%) of the women was para 1, with only 82(26.1%) being para 0. A majority of the women 200(63.7%) had gestational age at delivery of 40 completed weeks, with 87 (27.7%) at 41 completed weeks and only 27(8.6%) getting to 42 completed weeks and above. Booked women constituted majority with 203 (64.6%), spontaneous onset of labour occurred in 255 (81.2%) while 42 (13.4%) had induction of labour and 17 (5.4%) were not in labour. Among the women whose labour was induced, 20 (47.6%) had vaginal deliveries while 22 (52.4%) had caesarean delivery (CD), and the indications for these CD were CPD in 11 (50%), failed induction in 7 (31.8%) and fetal distress in 4 (18.2%).

Table 1: Maternal and obstetric characteristics of the women with postdate pregnancy

Variables (N = 314)	Frequency	Percentage
Age category		
≤20 years	10	3.2
21-30 years	166	52.8
31-40 years	134	42.7
>40 years	4	1.3
Parity		
Para 0	82	26.1
Para 1	137	43.6
Para 2-4	86	27.4
Para ≥5	9	2.9
Gestational age		
40 weeks	200	63.7
41 weeks	87	27.7
≥42 weeks	27	8.6
Booking status		
Booked	203	64.6
Unbooked	111	35.4
Type of labour		
Spontaneous	255	81.2
Induced	42	13.4
No labour	17	5.4
Mode of delivery		
SVD	167	53.2
CD	147	46.8
Type of CD (N = 147)		
Emergency CD	131	89.1
Elective CD	16	10.9

SVD = spontaneous vaginal delivery; CD = caesarean delivery.

The overall CD rate was 147 (46.8%) while 167 (53.2%) had vaginal deliveries. Majority of the CD were done as emergency 131 (89.1%) with 16 (10.9%) being elective or planned. The commonest indication for CD was cephalopelvic disproportion (CPD) accounting for 78 (53.1%), followed by fetal distress in 46 (31.2%), severe oligohydramnios in 10 (6.8%), failed induction in 7 (4.8%), prolonged labour in 5 (3.4%) and cervical dystocia in 1 (0.7%).

Regarding maternal complications and outcome among the women in the study, there was no maternal death recorded. The commonest complication was postpartum haemorrhage (PPH) recorded in 61 (19.4%), birth trauma (cervical or perineal tear) occurred in 7 (2.2%) (Two of these women with cervical laceration also had PPH) and shoulder dystocia in 1(0.4%). Majority of the women 245(78.0%) had no complication.

Regarding fetal outcome, the mean birth weight of the baby's ± SD was 3452.87±531.63g, with a median of 3500g and a range of 1700-5000 g. As depicted in Table 2, the majority 257 (81.9%) of the babies weighed 2500-3900 grams and 177 (65.4%) were of male gender. The stillbirth rate was 10 (3.2%) while 304(96.8%) were live births. Among the live births, 23 (7.6%) had Apgar score at 5 minutes <7, while 56 (18.4%) required admission to NICU. The commonest indication or diagnosis for admission to NICU were perinatal asphyxia 21 (37.5%) and macrosomia 20 (35.7%). Others were risk-for-neonatal-sepsis 5 (8.9%), hypoglycaemia 4 (7.1%), meconium-stained liquor 3 (5.4%), small for gestational age 2 (3.6%) and fractured limb 1 (1.8%).

Table 2: Neonatal outcome and characteristics of babies delivered by the women

Variables (N = 314)	Frequency	Percentage
Neonatal outcome		
Live birth	304	96.8
Still-birth	10	3.2
Sex		
Male	177	56.4
Female	137	43.6
Birth weight		
<2500 g	7	2.2
2500 – 3900 g	257	81.9
≥4000 g	50	15.9
Birth Asphyxia (N = 304)		
Yes	23	7.6
No	281	92.4
NICU Admission (N = 304)		
Yes	56	18.4
No	258	81.6

NICU = neonatal intensive care unit.

A comparison of the maternal and obstetric characteristics of the women according to the gestational age categorization was as depicted in Table 3. The proportion of induced labour was highest among those of GA 41 weeks 33.3%, followed by those of ≥42 weeks 22.2% and least in those of 40 weeks 3.5%, and differences in the type of labour according to gestational age category was statistically significant (P = 0.0001). With regards to the mode of delivery, the proportion that had CD increased as the GA increased, from 41.5% to 49.4% and 77.8% respectively for 40 weeks, 41 weeks and ≥42 weeks, and the difference was statistically significant (P = 0.002). There was no statistically significant difference between the GA categories in terms of types of CD (emergency or elective) (P = 0.867), booking status (P = 0.053), parity category (P = 0.192) and maternal age category (P = 0.340).

Table 3: Comparison of maternal and obstetric characteristics according to gestational age category among the women.

Variables	Gestational age category			Total N = 314 n (%)
	40 weeks N = 200 n (%)	41 weeks N = 87 n (%)	≥42weeks N = 27 n (%)	
Age category				
≤20 years	5 (2.5)	3 (3.4)	2 (7.4)	10 (3.2)
21 – 30 years	103 (51.5)	51 (58.6)	12 (44.4)	166 (52.8)
31 – 40 years	90 (45.0)	32 (36.8)	12 (44.4)	134 (42.7)
>40 years	2 (1.0)	1 (1.2)	1 (3.8)	4 (1.3)
	Fisher's exact test = 6.187; p-value = 0.340			
Parity				
Para 0	43 (21.5)	31 (35.6)	8 (29.6)	82 (26.1)
Para 1	88 (44.0)	37 (42.5)	12 (44.4)	137 (43.6)
Para 2 - 4	62 (31.0)	18 (20.7)	6 (22.2)	86 (27.4)
Para ≥5	7 (3.5)	1 (1.2)	1 (3.8)	9 (2.9)
	Chi Square = 8.693; p-value = 0.192			
Booking status				
Booked	136 (68.0)	55 (63.2)	12 (44.4)	203 (64.6)
Unbooked	64 (32.0)	32 (36.8)	15 (55.6)	111 (35.4)
	Chi Square = 5.883; p-value = 0.053			
Type of labour				
Spontaneous	183 (91.5)	54 (62.1)	18 (66.7)	255 (81.2)
Induced	7 (3.5)	29 (33.3)	6 (22.2)	42 (13.4)
No labour	10 (5.0)	4 (4.6)	3 (11.1)	17 (5.4)
	Fisher's exact test = 40.598; p-value = 0.0001*			
Mode of delivery				
SVD	117 (58.5)	44 (50.6)	6 (22.2)	167 (53.2)
CS	83 (41.5)	43 (49.4)	21 (77.8)	147 (46.8)
	Chi Square = 12.903; p-value = 0.002*			
Type of CD (N = 147)	N = 83	N = 43	N = 21	N = 147
Emergency CD	74 (89.2)	39 (90.7)	18 (85.7)	131 (89.1)
Elective CD	9 (10.8)	4 (9.3)	3 (14.3)	16 (10.9)
	Fisher's exact test = 0.544; p-value = 0.867			

*Statistically significant (*P<0.05*); SVD = spontaneous vaginal delivery; CD = caesarean delivery.

Table 4 relates to the comparison of the indications for CD between the gestational age categories, with the only statistically significant finding being failed induction (P = 0.019). The proportion of women requiring CD for failed induction increased from 1.0% to 2.3% and 11.1% for GA 40 weeks, 41 weeks, and ≥42 weeks respectively. There were no statistically significant differences between the GA categories in terms of CPD (P = 0.132), fetal distress (P = 0.403), severe oligohydramnios (P = 0.379), prolonged labour (P = 0.447), and cervical dystocia (P = 1.000). As shown in Table 5, there was no statistically significant difference in the comparison of the maternal complications that occurred and the GA categories in terms of postpartum haemorrhage (P = 0.172), maternal birth trauma (P = 0.579), and shoulder dystocia (P = 0.363).

Table 4: Comparison of indications for CD according to gestational age category among the women.

Variables	Gestational age category			Total N = 314 n (%)
	40 weeks N = 200 n (%)	41 weeks N = 87 n (%)	≥42weeks N = 27 n (%)	
CPD				
Yes	43 (21.5)	25 (28.7)	10 (37.0)	78 (24.8)
No	157 (78.5)	62 (71.3)	17 (63.0)	236 (75.2)
	Chi Square = 4.054; p-value = 0.132			
Fetal distress				
Yes	26 (13.0)	14 (16.1)	6 (22.2)	46 (14.6)
No	174 (87.0)	73 (83.9)	21 (77.8)	268 (85.4)
	Chi Square = 1.818; p-value = 0.403			
Oligohydramnios				
Yes	6 (3.0)	2 (2.3)	2 (7.4)	10 (3.2)
No	194 (97.0)	85 (97.7)	25 (92.6)	304 (96.8)
	Fisher's exact test = 2.016; p-value = 0.379			
Failed induction				
Yes	2 (1.0)	2 (2.3)	3 (11.1)	7 (2.2)
No	198 (99.0)	85 (97.7)	24 (88.9)	307 (97.8)
	Fisher's exact test = 7.759; p-value = 0.019*			
Prolonged labour				
Yes	5 (2.5)	0 (0.0)	0 (0.0)	5 (1.6)
No	195 (97.5)	87 (100.0)	27 (100.0)	309 (98.4)
	Fisher's exact test = 1.873; p-value = 0.447			
Cervical dystocia				

Yes	1 (0.5)	0 (0.0)	0 (0.0)	1 (0.3)
No	199 (99.5)	87 (100.0)	27 (100.0)	313 (99.7)
Fisher's exact test = 1.421; p-value = 1.000				

*Statistically significant (*p*<0.05); CPD = cephalopelvic disproportion.

Table 5: Comparison of maternal complications according to gestational age category among the women

	Gestational age category			
Variables	40 weeks N = 200 n (%)	41 weeks N = 87 n (%)	≥42weeks N = 27 n (%)	Total N = 314 n (%)
PPH				
Yes	45 (22.5)	13 (14.9)	3 (11.1)	61 (19.4)
No	155 (77.5)	74 (85.1)	24 (88.9)	253 (80.6)
Chi Square = 3.517; p-value = 0.172				
Birth trauma				
Yes	4 (2.0)	2 (2.3)	1 (3.7)	7 (2.2)
No	196 (98.0)	85 (97.7)	26 (96.3)	307 (97.8)
Fisher's exact test = 0.956; p-value = 0.579				
Shoulder dystocia				
Yes	0 (0.0)	1 (1.1)	0 (0.0)	1 (0.3)
No	200 (100.0)	86 (98.9)	27 100.0)	313 (99.7)
Fisher's exact test = 3.086; p-value = 0.363				

PPH = postpartum haemorrhage.

A comparison of the neonatal outcome and baby's characteristics according to the gestational age categories is displayed in Table 6. There was an increase in the proportion of stillbirth from 1.5% to 4.6% and 11.1% as the GA increased from 40 weeks to 41 weeks and ≥42 weeks respectively, and this difference was statistically significant (P = 0.022). Also, there was a statistically significant difference (P = 0.001) in the occurrence of birth asphyxia between the GA categories, with an increase in proportion from 4.6% to 9.6% and 25.0% for GA 40 weeks, 41 weeks, and ≥42 weeks respectively. Likewise, there was also a statistically significant difference (P = 0.022) in the admission to NICU between the GA categories, with an increase in proportion from 14.2% to 24.1% and 33.3% for GA 40 weeks, 41 weeks, and ≥42 weeks respectively. The differences between the GA categories in terms of sex of baby (P = 0.064) and birth weight category (P = 0.185) were not statistically significant.

Table 6: Comparison of neonatal outcome and characteristics of babies according to gestational age category among the women

	Gestational age category			
Variables	40 weeks N = 200 n (%)	41 weeks N = 87 n (%)	≥42weeks N = 27 n (%)	Total N = 314 n (%)
Neonatal outcome				
Live birth	197 (98.5)	83 (95.4)	24 (88.9)	304 (96.8)
Still-birth	3 (1.5)	4 (4.6)	3 (11.1)	10 (3.2)
Fisher's exact test = 7.092; p-value = 0.022*				
Sex				
Male	122 (61.0)	40 (46.0)	15 (55.6)	177 (56.4)
Female	78 (39.0)	47 (54.0)	12 (44.4)	137 (43.6)
Fisher's exact test = 5.554; p-value = 0.064				
Birth weight				
<2500g	5 (2.5)	2 (2.3)	0 (0.0)	7 (2.2)
2500 – 3900g	162 (81.0)	76 (87.4)	19 (70.4)	257 (81.9)
≥4000g	33 (16.5)	9 (10.3)	8 (29.6)	50 (15.9)
Fisher's exact test = 5.658; p-value = 0.185				
Birth Asphyxia (N = 304)	N = 197	N = 83	N = 24	N = 304
Yes	9 (4.6)	8 (9.6)	6 (25.0)	23 (7.6)
No	188 (95.4)	75 (90.4)	18 (75.0)	281 (92.4)
Fisher's exact test = 13.472; p-value = 0.001*				
NICU Admission (N = 304)	N = 197	N = 83	N = 24	N = 304
Yes	28 (14.2)	20 (24.1)	8 (33.3)	56 (18.4)
No	169 (85.8)	63 (75.9)	16 (66.7)	248 (81.6)
Fisher's exact test = 7.652; p-value = 0.022*				

*Statistically significant (*P*<0.05); NICU = neonatal intensive care unit.

The variables with an association on bivariate analysis were fitted into a multivariate logistic regression analysis, to see associations with GA at delivery of ≥42 weeks, as shown in Table 7. According to the analysis, only mode of delivery (CD) (P = 0.004) and fetal outcome (stillbirth) (P = 0.011) remained statistically significant. The gestational age ≥42 weeks was associated with a four-fold increased risk of caesarean delivery (OR 4.269; 95% CI 1.61-11.32) and seven-fold increased risk of stillbirth (OR 7.189; 95% CI 1.56-33.04).

Table 7: Multiple logistic regression showing factors associated with gestational age at delivery of ≥42 weeks in the study

Factors (N = 152)	Coefficient(B)	Odds ratio (OR)	95% CI	p value
Type of labour				
Induced	0.294	1.342	0.37 – 4.93	0.657
No labour/Spontaneous [R]		1		
Mode of delivery				
CD	1.451	4.269	1.61 – 11.32	0.004*
SVD [R]		1		
Failed induction				
Yes	1.463	4.321	0.62 – 30.14	0.140
No [R]		1		
Fetal outcome				
Still birth	1.973	7.189	1.56 – 33.04	0.011*
Live birth [R]		1		

*Statistically significant ($p<0.05$); CD = caesarean delivery; SVD = spontaneous vaginal delivery.

A further comparison of the mode of delivery and indications for CD was carried out according to the birth weight categories, to see if there was any relationship of these variables with fetal weight, as shown in Table 8. There was an increase in the proportion of CD from 28.6% to 44.0% and 64.0% with the fetal weight increase from <2500 g to 2500 g – 3900 g and ≥4000 g respectively, and the difference in modes of delivery was statistically significant (P = 0.020). Also, there was a statistically significant difference (P = 0.001) in the occurrence of CPD as indication for CD between the fetal weight categories, with an increase in proportion from 0.0% to 19.5% and 56.0% with the fetal weight increase from <2500 g to 2500 g – 3900 g and ≥4000 g respectively. The fetal weight categories did not significantly affect the occurrence of other indications for CD.

Table 8: Comparison of mode of delivery and Indications for CD according to the birth weight of babies delivered by the women.

Variables	Neonatal birth weight category			
	<2500 g N = 7 n (%)	2500 – 3900g N = 257 n (%)	≥4000g N = 50 n (%)	Total N = 314 n (%)
A. Mode of delivery				
SVD	5 (71.4)	144 (56.0)	18 (36.0)	167 (53.2)
CD	2 (28.6)	113 (44.0)	32 (64.0)	147 (46.8)
	Fisher's exact test = 7.592; p-value = 0.020*			
B. Indications for CD CPD				
Yes	0 (0.0)	50 (19.5)	28 (56.0)	78 (24.8)
No	7 (100.0)	207 (80.5)	22 (44.0)	236 (75.2)
	Chi Square = 32.307; p-value = 0.0001*			
Fetal distress				
Yes	2 (28.6)	41 (16.0)	3 (6.0)	46 (14.6)
No	5 (71.4)	216 (84.0)	47 (94.0)	268 (85.4)
	Chi Square = 4.426; p-value = 0.109			
Oligohydramnios				
Yes	0 (0.0)	10 (3.9)	0 (0.0)	10 (3.2)
No	7 (100.0)	247 (96.1)	50 (100.0)	304 (96.8)
	Fisher's exact test = 1.696; p-value = 0.504			
Failed induction				
Yes	0 (0.0)	6 (2.3)	1 (2.0)	7 (2.2)
No	7 (100.0)	251 (97.7)	49 (98.0)	307 (97.8)
	Fisher's exact test = 0.488; p-value = 1.000			
Prolonged labour				
Yes	0 (0.0)	5 (1.9)	0 (0.0)	5 (1.6)
No	7 (100.0)	252 (98.1)	50 (100.0)	309 (98.4)
	Fisher's exact test = 0.996; p-value = 1.000			
Cervical dystocia				
Yes	0 (0.0)	1 (0.4)	0 (0.0)	1 (0.3)
No	7 (100.0)	256 (99.6)	50 (100.0)	313 (99.7)
	Fisher's exact test = 2.572; p-value = 1.000			

*Statistically significant (*P<0.05*); SVD = spontaneous vaginal delivery; CD = caesarean delivery; CPD = cephalopelvic disproportion.

Discussion

The prevalence of postdate pregnancy varies widely between different studies. This study reports a prevalence of 9.0%, which is lower than the 17.36% and 23.4% reported by Punya *et al.* [25] and Stock *et al.* [22] respectively, but higher than the 6.23% and 7.3% reported by Gandotra *et al.* [26] and Haq *et al.* [27] respectively. The variations between studies may not be unconnected with the inclusion/exclusion criteria adopted by the studies. Those with lower incidences were observed to be mainly for uncomplicated postdate pregnancies, excluding high risk pregnancies, non-vertex presentations, previous CD, and multiple gestations, as was the case in our study. Also, the criteria used in ascertaining the duration of gestation and the reliability of pregnancy dating in the different studies, might be responsible.

Many studies agree that postdate pregnancies occur more often in younger women. In our study, majority of the women (52.8%) belonged to the age group of 21-30 years, however there was no

significant difference in the age groups when compared in the different categories of gestational age postdate. Other studies with similar categorization of maternal age group of 20-30 years have reported 85% [28], 69% [29], and 64% [30]. Some other studies used the age category of 20-35 years and reported 89.4% [31], 85.3% [32], and 80.2% [33].

Nulliparity is a recognized risk factor for postdate pregnancy [1] and various studies have reported incidence of 55.7% [10], 63% [26], and 74% [28] among primigravida. In contrast, this study found a higher prevalence among multiparous women, similar to reports of 53.29% and 54% by Chhetri *et al.* [31] and Naz *et al.* [34]. The higher occurrence among nulliparous women has been suggested to be likely due to inaccuracies in recollecting the exact date of last normal menstrual period, especially when the pregnancy is unplanned [10] and particularly where pregnancy dating was done by last menstrual period alone [35].

In our study, the spontaneous vaginal delivery rate was 53.2% while the CD rate was 46.8%, with no record of instrumental vaginal delivery (IVD). Postdate pregnancies are associated with higher rates of intervention, and many studies have reported high CD rates. Onyebuchi *et al.* [10] reported a 25% CD and 1.1% IVD rates, Singh N *et al.* [36] reported CD and IVD rates of 32% and 2% respectively, Chhetri *et al.* [31] reported 40.13% and 2% for CD and IVD respectively, while a study by Singh S, *et al.* [37] reported an even higher CD rate of 56.5%. The variations in the CD rates may be attributed to practice guidelines/protocols in the various centers, and the threshold for performing caesarean sections in labouring women. While it is arguable that some of our patients who had CD for delayed second stage of labour, classified as CPD, might have benefitted from IVD, but not when the risk of IVD outweigh the benefits in situations of lack of skills and minimal paediatric backup for neonatal resuscitation as was often the case in our center.

We also observed a significant correlation between gestational age and mode of delivery. There was a decreased rate of spontaneous vaginal delivery and increased rate of CD as the gestational age advanced. This finding has been corroborated by studies by Chhetri *et al.* [31], Bhriegu *et al.* [38], and Reddy [39]. While the study by Chhetri *et al.* [31] reported the highest proportion of CD (64.28%) in women between 41-42 weeks, we found a proportion of 49.4% at 41 weeks, rising to 77.8% in those ≥42 weeks. The most common indications for CD in this study were CPD in 53.1% and fetal distress in 31.2%. Other studies have reported varied proportions for similar indications, with Caughey *et al.* [11] reporting 23.5% for CPD and 21.4% for fetal distress, Chhetri *et al.* [31] reported 36.0% and 21.3% for fetal distress and failed induction respectively, Akther *et al.* [40] reported 25.3% for fetal distress and 24% for failed induction, while Maheshwari *et al.* [41] reported 42.8% for failed induction and 33.3% for fetal distress. The high incidence of CPD was as a result of fetal macrosomia which follows prolonged pregnancy, as we also found a significant increase in CD proportion according to increasing fetal birth weight. Fetal hypoxia from placental insufficiency, which is commonly associated with postdate pregnancy and made worse during labour, might be responsible for fetal distress.

The main maternal complication recorded in our study was PPH (19.4%) followed by maternal birth trauma (2.2%). Onyebuchi *et al.* [10] also reported PPH as their primary maternal complication in 6.8%, and Botcha *et al.* [28] reported PPH in 6%. Bhriegu *et al.* [38] reported maternal complications of perineal tear and also PPH. The occurrence of PPH may not be unconnected with uterine atony associated with induced labour, and caesarean sections, while the maternal birth trauma may be associated with fetal macrosomia.

Various studies have reported increased fetal complications and NICU admission rates. We not only found NICU admission rate of 18.4%, but there was also a significant increase in the proportion admitted, as the gestational age increased. The main reasons for requiring NICU admission were perinatal asphyxia in 37.5% and macrosomia in 35.7%. Other studies have reported macrosomia rates of 6% [4], 10.2% [10], and 13% [42] which were all lower than the overall macrosomia rate in this study of 15.9%. Chhetri *et al.* [31] reported NICU admission rate of 16.44%, with perinatal asphyxia (12.5%) and meconium aspiration (8.55%) as the main reasons. Kistka *et al.* [43] reported an even higher proportion of 40% for NICU admissions, but with meconium aspiration syndrome as the leading cause. The stillbirth rate in our study was 3.2% and the overall perinatal asphyxia rate was 7.6%, and the proportion of both significantly increased with increase in gestational age, a finding corroborated by Punya *et al.* [25].

Limitations
The retrospective design of the study was a limitation. Some of the babies requiring NICU admission were either referred to other centers due to lack of bed space, or left against medical advice due to financial constraints, and so we did not follow up the outcome of NICU admissions, as the medical records of a sizeable number of these babies was not available. Also, the accuracy of pregnancy dating in the unbooked women could be debatable. A larger sample size and prospective study design might have provided additional power to show statistically significant differences for some of the variables.

Conclusion
Postdate pregnancy was significantly associated with poor maternal outcome in the form of increased caesarean delivery rates, primarily due to cephalopelvic disproportion and fetal distress. Perinatal mortality was high, and fetal complications, especially perinatal asphyxia resulted in higher rates of admission to neonatal intensive care unit. Because of this poor neonatal outcome and increased obstetric intervention, early induction of labour before 41 completed weeks may be helpful to reduce adverse outcomes in postdate pregnancy.

References
1. Crowley P. Prolonged pregnancy. In: Edmonds DK, ed. Dewhurst's Textbook of Obstetrics and Gynaecology. 7th ed. Oxford: Oxford University Press. 2007:192-204.
2. World Health Organization (WHO). ICD-10: International statistical classification of diseases and related health problems: tenth revision, 2nd ed. WHO 2004. Last accessed; c2023 Oct. Available at: https://www.who.int/iris/handle/10665/42980.
3. Fernando A. Prolonged pregnancy. In: Nasim S, ed. Practical guide to high-risk pregnancy and delivery. Noida:

Elsevier; c2008: p. 255-256.

4. Chantry AA, Lopez E. [Fetal and neonatal complications related to prolonged pregnancy]. J Gynecol Obstet Biol Reprod (Paris). 2011;40(8):717-725. https://dx.doi.org/10.1016/j.jgyn.2011.09.007.

5. Olesen AW, Westergaard JG, Olsen J. Perinatal and maternal complications related to postterm delivery: A national register-based study, 1978-1993. Am J Obstet Gynecol. 2003;189(1):222-7. https://dx.doi.org/10.1067/mob.2003.446

6. Divon MY, Ferber A, Nisell H, Westgren M. Male gender predisposes to prolongation of pregnancy. Am J Obstet Gynecol. 2002;187(4):1081-3.

7. Usha Kiran TS, Hemmadi S, Bethel J, Evans J Outcome of pregnancy in a woman with an increased body mass index. BJOG. 2005;112(6):768-72.

8. Taipale P, Hiilesmaa V. Predicting delivery date by ultrasound and last menstrual period in early gestation. Obstet Gynecol. 2001;97(2):189-94.

9. Savitz DA, Terry Jr JW, Dole N, Thorp JM Jr, Siega-Riz AM, Herring AH, et al. Comparison of pregnancy dating by last menstrual period, ultrasound scanning, and their combination. Am J Obstet Gynecol. 2002;187(6):1660-6.

10. Onyebuchi A, Okafor L, Mamah J, Obi V, Esike C, Umeora O, et al. Management and Obstetric Outcomes of Post-date Pregnancies in Abakaliki, Ebonyi State, Southeast Nigeria: A Cross-sectional Study. International Journal of Women's Health and Reproduction Sciences. 2023;11(1):33-36.

11. Caughey AB, Washington AE, Laros RK. Neonatal complications of term pregnancy: rates by gestational age increase in a continuous, not threshold, fashion. Am J Obstet Gynecol. 2005;192(1):185-90.

12. Caughey AB, Stotland NE, Washington AE, Escobar GJ. Maternal and obstetric complications of pregnancy are associated with increasing gestational age at term. Am J Obstet Gynecol. 2007;196(2):155E1-E6.

13. Heimstad R, Romundstad PR, Salvesen KA. Induction of labour for post-term pregnancy and risk estimates for intrauterine and perinatal death. Acta Obstet Gynecol Scand. 2008;87(2):247-9.

14. Nakling J, Backe B. Pregnancy risk increases from 41 weeks of gestation. Acta Obstet Gynecol Scand. 2006;85:663. https://dx.doi.org/10.1080/00016340500543733.

15. De Los Santo-Garate AM, Villa-Guillen M, Villanueva-Garcia D. Perinatal morbidity and mortality in late-term and post-term pregnancy. NEOSANO perinatal network's experience in Mexico. J Perinatol. 2011;31:789. https://dx.doi.org/10.1038/jp.2011.43.

16. Bruckner TA, Cheng YW, Caughey AB. Increased neonatal mortality among normal-weight births beyond 41 weeks of gestation in California. Am J Obstet Gynecol. 2008;199:421. e1. https://dx.doi.org/10.1016/j.ajog.2008.05.015.

17. Royal College of Obstetricians and Gynaecologists (RCOG). Induction of Labour. Evidence based clinical Guidelines No. 9. London: RCOG Press; c2001.

18. World Health Organization (WHO). WHO Recommendations: Induction of Labour at or beyond Term. WHO News Bulleting; c2018.

19. Dasari P, Niveditta G, Raghavan S. The maximal vertical pocket and amniotic fluid index in predicting fetal distress in prolonged pregnancy. Int J Gynaecol Obstet. 2007;96(2):89-93.

20. Treger M, Hallak M, Silberstein T, Friger M, Katz M, Mazor M, et al. Post-term pregnancy: should induction of labor be considered before 42 weeks? J Matern Fetal Med. 2002;11:50-3.

21. Gibson KS, Waters TP, Bailit JL. Maternal and neonatal outcomes in electively induced low-risk term pregnancies. Am J Obstet Gynecol. 2014;211(3):249e1-e16.

22. Stock SJ, Ferguson E, Duffy A, Ford I, Chalmers J, Norman JE, et al. Outcomes of elective induction of labour compared with expectant management: population-based study. Bmj. 2012, 344.

23. Grobman WA, Rice MM, Reddy IJM, Tita ATN, Silver RM, Mallett G, et al. Labor Induction versus Expectant Management in Low-Risk Nulliparous Women. New England Journal of Medicine. 2018;379(6):513-23.

24. Gelisen O, Caliskan E, Dilbaz S, Ozdas E, Dilbaz B, Haberal A, et al. Induction of labor with three different techniques at 41 weeks of gestation or spontaneous follow-up until 42 weeks in women with definitely unfavorable cervical scores. Eur J Obstet Gynecol Reprod Biol. 2005;120(2):164-9.

25. Punya BS, Sailakshmi MPA. Study of postdated and term pregnancy with fetomaternal outcome at RRMCH. Indian Journal of Obstetrics and Gynaecology Research. 2017;4(2):179-83.

26. Gandotra N, Gupta H. Maternofetal Outcome of Postdated Pregnancy: A Retrospective Analysis. Journal of Health Sciences & Research 2021;12(1):1-4. https://dx.doi.org/10.5005/jp-journals-10042-1098

27. Haq AN, Ahsan S, Sher Z. Induction of labour in postdate pregnant women. Journal of the College of Physicians and Surgeons Pakistan. 2012;22(10):644-47.

28. Botcha H, Agrawal S, Dora AK. The Fetomaternal Outcome in Pregnancy beyond 40 weeks of Gestation at a Tertiary Center. Journal of South Asian Federation of Obstetrics and Gynaecology. 2023;15(3):279-82.

29. Dobariya PV, Shah PT, Ganatra HK. Feto-maternal outcome in pregnancy beyond 40 weeks. Int J Reprod Contracept Obstet Gynecol. 2017;6:527-31.

30. Patel N, Modi P. A Study of Maternal and Fetal Outcomes in Postdate Pregnancy. International Journal of Science and Research (IJSR). 2017;6:9. Available from https://www.ijsr.net/archive/v6i9/ART20176508.pdf

31. Chhetri PB, Shrestha BK, Shrestha S, Pathak P, Shrestha R, Acharya M, et al. Maternal and fetal outcome in pregnancy beyond the expected date of delivery in a tertiary care hospital of Nepal. Journal of Chitwan Medical College. 2022;12(40):47-50.

32. Gupta M, Shrivastava S, Rai S. To study the maternal and fetal outcome in pregnancy beyond 40 weeks. Int J Clin Obstet Gynaecol. 2020;4(2):123-9.

33. Kandalgaonkar VP, Kose V. Fetomaternal outcome in post-dated pregnancy. Int J Reprod Contracept Obstet Gynecol. 2019;8(5):1899-907.

34. Naz FA, Javid AM, Saeed SA, Begum A, Zareen A. Neonatal outcome in post-term pregnancy. PJMHS 2010;4(3):248-251.

35. Divon MY, Feber A, Sanderson M, Nisell H, Westgren M. A functional definition of prolonged pregnancy based on daily fetal and neonatal mortality rates. Ultrasound Obstet Gynecol. 2004;23(5):423-26.

36. Singh N, Misra D, Srivastava S. Postdated pregnancy: its maternal and fetal outcome. Int J Reprod Contracept Obstet Gynecol. 2020;9(8):3605-9.

37. Singh S, Gupta HP, Verma U, Yadav G. The study of maternal and perinatal outcomes in prolonged pregnancy. Int J Reprod Contracept Obstet Gynecol. 2017;6(3):1067-70.
38. Bhriegu R, Agrawal M, Hariharan C. Assessment of maternal and perinatal outcome in postdated pregnancy. Journal of Datta Meghe Institute of Medical Sciences University. 2017;12(1):35-40.
39. Reddy SR. Study of Maternal and Fetal Outcomes between 37 to 42 weeks of Pregnancy. IOSR Journal of Dental and Medical Sciences. 2018;17(6):54-8.
40. Akther S. Maternal and perinatal outcome in postdated pregnancy: A study of 100 cases in Bangladesh armed forces. Journal of Armed Forces Medical College of Bangladesh. 2014;10(1);39-44.
41. Maheshwari S, Rajoria L, Hemani S, Kuntal C, Bansal A. Feto-maternal outcome in postdated pregnancy. International Journal of Medical and Biomedical Studies. 2021;5(2):116-8.
42. Cucco C, Osborne MA, Cibils LA. Maternal-fetal outcomes in prolonged pregnancy. Am J Obstet Gynecol. 1989;161(4):916-20. https://dx.doi.org/10.1016/0002-9378(89)90751-5
43. Kistka ZAF, Palomar L, Boslaugh SE, DeBaun MR, DeFranco EA, Muglia LJ, *et al*. Risk for postern delivery after previous postterm delivery. Am J Obstet Gynecol. 2007;196(3):241e1-241e6. https://dx.doi.org/10.1016/j.ajog.2006.10.873