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**Research Article**

# Maternal and fetal factors observed with late preterm births

**Madhusudan Dey*, Raju Agarwal, Devkalyan Maji, Uttara A. Kohli**

Fetal Medicine Div, Department of Obstetrics and Gynaecology, AFMC, Pune, India

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***Correspondence:**
Dr. Madhusudan Dey,
E-mail: deym1@yahoo.com



## ABSTRACT

**Backround:** Although neonatal morbidity and mortality rates are fallen in recent decades, the prevalence of preterm deliveries has increased especially late preterm births. Late preterm deliveries are at increased risk of various neonatal complications compared to term deliveries.
This study was carried out to identify the maternal characteristics and co-morbidites found with late preterm births and feto-maternal outcome in terms of indication of delivery, route of delivery, Apgar score and NICU admissions.
**Methods:** A retrospective study was conducted in a tertiary care teaching hospital of Indian armed forces between Jan 2011 to Dec 2012 where 248 late preterm deliveries were analysed.
**Results:** 56% women had spontaneous late preterm births and 44% women were induced. 23% of patients had history of 1 or more prior abortion and 13% patients had previous fetal deaths among the patients had late preterm delivery. Common maternal morbidities in mother delivering late preterm were hypertensive disorders of pregnancy (20.6%), anaemia (14.5%) and preterm premature rupture of membrane (13.7%). 4.8% newborns had Apgar ≤ 7 and 10% newborns required NICU admissions.
**Conclusion:** Higher incidences of hypertensive disorders of pregnancy, anaemia and preterm premature rupture of membrane were found with late preterm birth and 10% of newborns required NICU care.

**Keywords:** Late preterm birth, Hypertensive disorder of pregnancy, Anaemia, Preterm premature rupture of membrane, Apgar score

## INTRODUCTION

Infants born between 34 and 36 6/7 weeks period of gestation are termed as late preterm birth. According to data available, late preterm infants are the fastest growing subgroup of neonates and constitute approximately 75% of all preterm births in 2009[1] and increased about 25% over a decade. Majority of late preterm births are due to spontaneous labour, preterm premature rupture of membrane as well as deliveries due to feto-maternal indications. Though the upper limit of gestational age for tocolysis and steroid induction for fetal lung maturity is not well defined but most institutions do not recommend the use of antenatal corticosteroid or tocolysis after 34 completed weeks of gestation and our institution also follow the same protocol. With improved neonatal care, infants born beyond 34 weeks have been considered 'near term' and perinatal outcomes in neonates born after 34 weeks are certainly improved when compared with infants born before this gestational age. But as compared to term deliveries, late preterm deliveries are at increased risk for complications including transient tachypnea of newborn (TTN), respiratory distress syndrome (RDS), persistent pulmonary hypertension (PPHN), respiratory failure, temperature instability, jaundice, feeding difficulties and prolonged neonatal intensive care unit (NICU) stay.[2] The study was planned to identify the maternal characteristics observed with late preterm births and feto-maternal outcome in terms of indication of delivery, route of delivery, Apgar score and NICU admissions.

## METHODS

This study was a retrospective observational study of women attending labour room for delivery and data was collected over a period of two years starting from

January 2012 till December 2013 at a tertiary care teaching hospital of armed forces, India. The local ethics committee approved the study protocol.

The study included 248 deliveries with inclusion criteria of women registered at first trimester and delivering between 34 and 36 6/7 weeks period of gestation. Period of gestation (POG) was confirmed by dates and correlated with ultrasonography (USG). In case of unsure dates, ultrasonography-expected date of delivery (USG-EDD) of first trimester was taken to calculate POG.

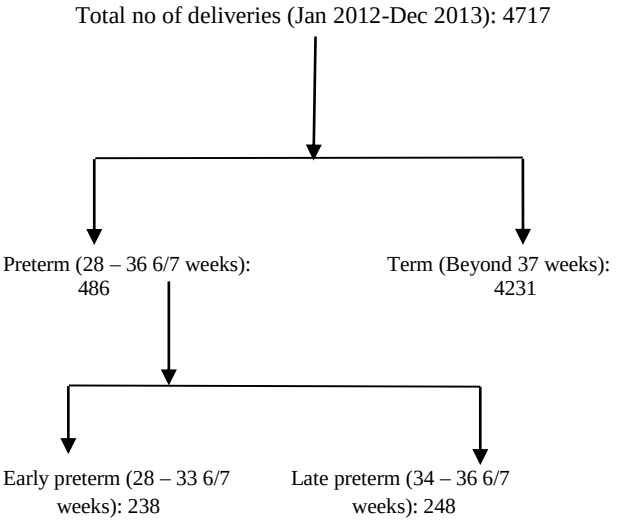
Data have been collected regarding the following aspects:

1. Socio-demographic data;
2. Maternal characteristics in current pregnancy;
3. Indication of delivery
4. Mode of delivery;
5. Apgar score and NICU admissions.

Gestational hypertension has been defined according to the ACOG criteria.[3] Gestational diabetes was defined according to the International Association of Diabetes and Pregnancy Study Groups Consensus Panel.[4] Preterm premature rupture of membrane (PPROM) defined as rupture of membrane before the onset of labour pains. Artificial reproductive techniques include In vitro fertilisation (IVF), Intra-uterine insemination (IUI), Frozen embryo transfer (FET). Patients were considered anaemic if haemoglobin level was < 10 gm%. For socio-economic status, monthly income was taken into consideration and divided in three groups namely low (Rs < 15,000), middle (Rs 15,000-30,000), and high (Rs > 30,000).

**Statistical analysis:** Statistical analysis was carried out by using EPI 2007. For this study, analysis of socio-demographic factors, obstetric risk factors and outcome of late preterm births were done by calculating Confidence Interval (CI) and percentage distribution.

## RESULTS




4717 number of patients delivered during the 2 yrs period of study. Among them 486 (10.30%) patients delivered preterm (28 – 36 6/7 weeks) and 248 (5.25%) patients had late preterm delivery.

Maternal characteristics in table 1 showed that most of the late preterm deliveries (58%) are in age group of below 25 yrs. Primipara as well as multiparas had similar rate of late preterm delivery. 67.7% of middle socioeconomic group of patients had late preterm delivery. 23% of patients had history of 1 or more prior abortion and 13% patients had previous fetal deaths among the patients had late preterm delivery.

Obstetric factors observed in late preterm deliveries are shown in table 2. Hypertensive disorders of pregnancy which includes gestational hypertension, preeclampsia and superimposed preeclampsia on chronic hypertension were found in maximum (20.6%) number of deliveries. There were no cases of eclapmsia in this study. Anaemia (14.5%) and preterm premature rupture of membrane (13.7%) are the next two factors observed with late preterm birth. Multiple pregnancy (7.3%) and artificial reproductive techniques (5.2%) are also found with late preterm labours. When two or more factors were found, incidence of late preterm labour was 24.2% in this study.

Obstetric outcome is tabulated in table 3 which showed that about 30% deliveries are induced mainly for maternal complication like severe preeclampsia, PPROM. About 41% of patients underwent caesarean section for different indications in this study. 70% of newborns were weighed more than 2 Kg. Approximately 10% of newborns were required NICU admissions among which 4.8% had Apgar of 7 or below at 5 min.

**Table 1: Socio-demographic factors of late preterm birth.**

| (n=248) Maternal age (Years) | No (n) | Percentage (%) | 95% CI |
|---|---|---|---|
| < 25 | 144 | 58.1 | |
| 26-30 | 78 | 31.4 | |
| 31-35 | 21 | 8.5 | |
| >35 | 5 | 2 | |
| Parity | | | |
| Primipara | 122 | 49.2 | 42.97 – 55.41 |
| Multipara | 126 | 50.8 | 44.58 – 57.03 |
| Socioeconomic status | | | |
| Low | 69 | 27.8 | |
| Middle | 168 | 67.7 | |
| High | 11 | 4.5 | |
| H/o abortion | | | |
| No | 191 | 77 | 71.77 – 82.25 |
| Yes | 57 | 23 | 17.75 – 28.22 |
| H/o fetal death in previous pregnancy | | | |
| Yes | 32 | 12.9 | 8.73 – 17.08 |
| No | 216 | 87.1 | 82.92 – 91.26 |

**Table 2: Obstetrics factors for late preterm birth.**

| Obstetric factors (n=248) | No (n) | Percentage (%) | 95% CI |
|---|---|---|---|
| Hypertensive disorders of pregnancy | 51 | 20.6 | 15.53 – 25.59 |
| Anaemia (Hb < 10 gm%) | 36 | 14.5 | 10.13 – 18.90 |
| Preterm premature rupture of membranes | 34 | 13.7 | 9.43 – 17.99 |
| Post caesarean pregnancy | 25 | 10.1 | 6.33 – 13.83 |
| Multiple pregnancy (Twins) | 18 | 7.3 | 4.02 – 10.48 |
| Gestational diabetes mellitus | 15 | 6 | 3.08 – 9.02 |
| Artificial reproductive techniques | 13 | 5.2 | 2.46 – 8.01 |
| Immunological factors | 9 | 3.6 | 1.30 – 5.95 |
| Malpresentations | 9 | 3.6 | 1.30 – 5.95 |
| Uterine anomalies | 6 | 2.4 | 0.50 – 4.33 |
| 2 or more factors | 60 | 24.2 | 18.86 – 29.52 |

**Table 3: Outcome of late preterm birth.**

| Labour (n=248) | No (n) | Percentage (%) | 95% CI |
|---|---|---|---|
| Induced | 109 | 43.9 | 37.77 – 50.12 |
| Spontaneous | 139 | 56.1 | 49.87 – 62.22 |
| Mode of delivery | | | |
| Normal | 142 | 57.3 | 51.10 – 63.41 |
| Elective caesarean | 39 | 15.7 | |
| Emergency caesarean | 63 | 25.4 | |
| Instrumental | 4 | 1.6 | |
| Birth weight (Kg) | | | |
| < 1.5 | 12 | 4.8 | |
| 1.5-1.99 | 63 | 25.4 | |
| 2 – 2.5 | 111 | 44.8 | |
| >2.5 | 62 | 25 | |
| APGAR | | | |
| ≤ 7 | 9 | 3.6 | 1.30 – 5.95 |
| >7 | 236 | 95.2 | |
| NICU admission | | | |
| Yes | 24 | 9.7 | 5.99 – 13.35 |
| No | 224 | 90.3 | |

## DISCUSSION

Most of the studies in literature are mainly for preterm deliveries i.e. deliveries < 37 weeks period of gestation but this study only included late preterm births, a population that may differ from overall preterm deliveries. Young and advanced maternal age, low socioeconomic statuses are known risk factors for preterm labour. Data from retrospective study of Carter et al in 2011 quoted that age < 17 and > 35 is associated with increased risk of late preterm birth.[3] In our study patients who were less than 25 yrs of age had maximum (58%) no of late preterm deliveries and 13% deliveries were in less than 20 yrs age group. Significant no (67%) of our patients are belong to middle socioeconomic status followed by 28% of patients in low socioeconomic group.

Melamed et al. in 2008[4] reported a significant increased prevalence of late preterm birth in nulliparous patient but in our study we did not find any significant association of late preterm birth with parity. Mandruzzato et al. also supported our findings.[5] Association of previous abortion whether induced or spontaneous with late preterm birth is still not clear. In their review Throp et al. reported an increase risk of preterm birth among women who previously had induced abortion.[6] In this present study 23% women had late preterm birth with history of previous abortion and among them 7% of women had history of 2 or more abortions. Previous history of fetal loss and associated other obstetric co-morbidity may be associated with late preterm birth as in our study 13% of women had late preterm deliveries with previous history of one or more fetal loss.

Till date very few studies have addressed the etiology of late preterm deliveries. According to Reddy et al, late preterm births are due to various factors mainly; maternal medical conditions, obstetric complications, major congenital anomalies, isolated spontaneous deliveries and no recorded indications, which accounted for 14%, 16%, 1%, 49% and 23.2% of all deliveries respectively.[7] Laughon et al reported that spontaneous labor, preterm premature rupture of membranes, and indicated deliveries each accounted for about 30% of late preterm births [8]. In our study 56% of patients had spontaneous late preterm labour and 44% of patients were induced labour for various maternal and fetal factors mainly due to preeclampsia, PPROM. Spontaneous labour and/or rupture of membranes were the most common (92%) indications for late preterm delivery reported by Lubow et al.[9] The increase incidence of late preterm birth is thought to be attributable, in large part, to an increase in obstetric interventions, often resulting from maternal complications or preexisting medical conditions.[10]

A number of maternal medical conditions, including hypertensive disorders of pregnancy, diabetes, and asthma, are associated with an increased risk for indicated or spontaneous preterm birth. The decision to deliver an infant preterm is informed by balancing the morbidity and mortality risks that are associated with prematurity against the maternal and fetal consequences of continuing the pregnancy.[11] In this present study, we also found that increase incidence of late preterm birth with hypertensive disorder of pregnancy (21%), maternal anaemia (15%) and preterm premature membrane (14%). Gestational diabetes mellitus and artificial reproductive techniques were also observed with increase rate of late preterm deliveries which were 6% and 5% respectively. 11 different factors which were observed with late preterm births are listed in Table 2. We have found that when 2 or more factors were found, the chance of having late preterm birth was 25%.

Mode of delivery also differs from term deliveries in cases of late preterm birth as many cases are induced for medical indications. Late preterm infants are associated with very high caesarean section rate and have more medical problems and poorer short-term outcomes than term infants.[12] Medically indicated elective caesarean sections were responsible for the majority of all late preterm deliveries.[7,8] In our study, 41% patients underwent caesarean section among which 25% patient had emergency caesarean as shown in table 3. Among all the cases of caesarean section 9% patients underwent repeat caesarean and 5 patients had successful trial of labour after caesarean section.

By 34 weeks' gestation, new born infants have a lower risk for neonatal complications such as respiratory distress syndrome than infants who are born earlier; therefore, many of the obstetric management decisions use 34 weeks as an influential marker for assessing the potential for developing new born complications.[13] Various studies in literature reported that late preterm neonates are at higher risk of morbidities than their term counterparts and neonatal morbidites are 7 times higher than term deliveries.[14] Available data have suggested respiratory distress syndrome (RDS), persistent pulmonary hypertension of newborns (PPHNs), hyperbilirubinemia, intraventricular hemorrhage (IVH), culture-proven sepsis, temperature instability, hypoglycemia, dehydration and feeding difficulties occurred more frequently in late preterm neonates than their term counterparts.[15,16] In this study, 30% new born had weight less than 2 Kg and among them 5% newborn weighed less than 1.5 Kg. 3.6% new born had Apgar 7 or less and 10% new born required NICU admission for various neonatal problems. Among the NICU admissions, 5% was due to very low birth weight and 4% for respiratory distress. Out of 248 late preterm births, 3 women had fetal loss. All the 3 women delivered at an average of 34 weeks period of gestation, two of them had no co-morbid condition and one had severe preeclampsia with intra uterine growth restriction.

Large number of late preterm deliveries were analysed in this study which is one of the strength. Data provided here may be one of the first of its kind from India. In addition, almost all our patients had similar socio‑economic situations, education, and smoking status. Several important limitations must be considered when interpreting the results of our study. First, it was a retrospective study and we are not able to provide the details regarding various neonatal complications, reasons for neonatal admission in NICU. Second, in the maternal factors we do not have the details about previous preterm or late preterm deliveries which we think would have been an important risk factor. Finally, another limitation of the present study is that it was done in only one medical centre.

## CONCLUSION

Higher incidences of hypertensive disorders of pregnancy, anaemia and preterm premature rupture of membrane were found with late preterm birth and 10% of newborns require NICU care.

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