

## Original Research Article

# Perinatal Outcome and Associated maternal Co-morbid conditions in late Preterm Births - A Prospective study at Kles Dr. Prabhakar Kore Hospital, Belgaum, India

Divyakala Karegoudar<sup>1</sup>, Arati Prabhu<sup>2</sup>, Kapil Amgain<sup>2\*</sup> and Mukesh Dhital<sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynaecology, KLE University's Jawaharlal Nehru Medical College, Nehru Nagar, Belgaum – 590 010 Karnataka, India

<sup>2</sup>Post graduate student, Jawaharlal Nehru Medical College

\*Corresponding author

## ABSTRACT

### Keywords

Induced labour;  
Late preterm birth;  
Mode of delivery;  
Spontaneous labour

Infants born between 34 and 36 weeks and 6 days gestation, referred to as “late preterm”. There is higher incidence of morbidity and mortality in late preterm births. This study was aimed to find out the incidence of late preterm births and to identify mode of delivery, causes, maternal co-morbid conditions and perinatal outcomes. This one year prospective study was conducted on a total of 161 pregnant women who delivered between 34-36 weeks and 6/7 days at Department of Obstetrics and Gynaecology, KLE'S Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum from November 2012 to November 2013. The maternal and perinatal outcome were assessed. Most of the women 56 (34.78%) were aged 22 to 25 years and mean age was  $24.54 \pm 4.18$  years. Primi para was noted in 85 (52.80%) of the women and history of previous preterm pregnancy was present in 3.11% of women. Labour was indicated in 60 (37.27%) of the women while in 101 (62.73%) it was spontaneous. In those with indicated labour, 14 (36.84%) were induced and 36.84% underwent vaginal delivery while 24 (63.16%) had emergency LSCS. With regard to spontaneous labour, 67 (66.34%) had vaginal delivery and 34 (33.66%) had emergency LSCS. Post partum eclampsia and eclampsia were noted in 2(1.24%) each. The incidence of late preterm birth was 61.68%. Most of the babies (41.61%) had birth weight between 1.51 to 2.00 Kgs and mean birth weight was  $2.19 \pm 0.48$  Kgs. There were 84 (52.17%) of babies who required NICU admission and low birth weight 51 (60.71%) was the commonest cause. The mortality was observed in 5 (5.95%) of the babies. Late preterm births being a large sub-group of preterm makes significant impact on perinatal outcome at each week of gestation 34, 35 and 36 weeks 6 days respectively. Hence managing late preterm births needs judicious decision making to reduce the mortality and morbidity.

## Introduction

Preterm birth is the most frequent cause of neonatal morbidity and mortality.<sup>1</sup> Infants born between 34 and 36 weeks and 6 days gestation, referred to as “late preterm”

have a higher incidence of morbidity and mortality when compared with term infants (37-42 weeks). Among preterm births (<37 completed weeks), late preterm

infants are both the largest proportion (71.3%)<sup>2</sup> and the fastest growing subgroup.<sup>3</sup>

Late preterm newborns are the fastest growing subset of neonates, accounting for approximately 74% of all preterm births and about 8% of total births<sup>4</sup>. The late preterm birth rate has risen 25% since 1990. Many reasons, such as increased caesarean delivery rate (30.3%), the increased rate of labor induction (22.3%), and increasing prevalence of maternal co-morbid factors that increase the chances of adverse pregnancy outcome, could play a significant contribution to this increase in late preterm birth.<sup>4</sup>

Physiologically late preterm infants are less mature and have limited compensatory responses to external environment, compared with term infants. Very little research has been done on late preterm infants although they belong to largest subgroup of preterm infants. The reason is labeling them as “near term” thus being observed as “almost mature” with very little need to be concerned<sup>5</sup>.

Understanding morbidity risks among late preterm infants is important for helping newborn care providers to anticipate and to manage potential morbidity during birth hospitalization. It may possibly assist in guiding non-emergency obstetric interventional decisions.<sup>3</sup> The present study was designed to find out the incidence of late preterm births and, to study the relation between mode of delivery and perinatal outcome, to identify and evaluate the causes (spontaneous) and the maternal co-morbid conditions associated with it.

## **Materials and Methods**

This one year prospective study was

conducted in the Department of Obstetrics and Gynaecology of a tertiary care centre in North Karnataka from November 2012 to November 2013. The ethical clearance was obtained from Human Ethics Committee prior to the commencement. Pregnant women who delivered between 34 – 36 weeks and 6/7 days were studied. Pregnant women who entered the third trimester of pregnancy and were diagnosed as a case of late preterm labour (34 0/7 – 36 6/7) weeks and women with singleton pregnancy were included in the study.

Pregnant women referred where foetal prognosis is disregarded and with intra uterine fetal demise were excluded due to inadequate information and those who were initially admitted as threatened preterm labour and responded to management and were subsequently discharged or delivered at term were also excluded from further analysis. The selected pregnant women were informed in detail about the nature of the study and a written informed consent was obtained before enrolment.

Demographic data like age, occupation, socio-economic status were obtained and recorded on pre-designed and pre-tested proforma. Patients were interviewed for obstetric history. A thorough clinical examination was conducted and findings were noted. The selected women were assessed for perinatal outcome that is, onset of labour, mode of delivery, indication for caesarean section, maternal co-morbid conditions associated with late preterm births and its indications (spontaneous/medical/elective).

The perinatal outcome comprised of birth weight, APGAR score and complications, patients admission to NICU and perinatal death.

The sample size was determined by using formula as below

$$n = Z^2 pq / d^2 = (1.96)^2 \times p q / d^2$$

Where,  $p = 16\%$ ,  $q = 84\%$ ,  $d = 4\%$ ,  $n = 322 / 2$

$n = 161$

Hence the sample size of 161 was considered

### **Statistical analysis**

The data obtained was systematically tabulated on Microsoft excel spread sheet and expressed as rates, ratios, percentages and mean  $\pm$  standard deviation (SD).

### **Results and Discussion**

During the assessment period that is, 15<sup>th</sup> November, 2012 to 15<sup>th</sup> November, 2013 there were 1696 live births. Of these 261 (15.38%) were preterm birth and 161 (9.49%) were late preterm birth. Among the preterm babies the incidence of late preterm was determined to be 61.68%

Most of the women 56 (34.78%) were aged 22 to 25 years. The mean age was  $24.54 \pm 4.18$  years. Class III Socio economic status was noted in 62.11% of the total women according to modified B. G. Prasad's Classification.<sup>6</sup> There were 29.81% working women while 70.19% of the women were housewives. The body mass index in 72.67% of the women was between 25.01 to 30.00 Kg/m<sup>2</sup> and mean body mass index was  $26.99 \pm 2.85$  kg/m<sup>2</sup>. Primi para was noted in 85 (52.80%) of the women while para 1 and 2 was noted in 32.92% and 11.18% respectively.

History of previous preterm pregnancy was noted in 3.11% of women.

Labour was indicated in 60 (37.27%) of the women while in 101 (62.73%) it was spontaneous. In the present study of the 60 women with indicated labour, 38 women were induced and of these 14 (36.84%) underwent vaginal delivery and the remaining (24, 63.16%) had emergency LSCS.

Elective LSCS was noted among 8 (13.33%) and indicated uninduced emergency LSCS was recorded in 14 (23.34%) women. Of the 101 women who had spontaneous labour, 67 (66.34%) had vaginal delivery and emergency LSCS was noted among 34 (33.66%). Overall, 80 women had LSCS delivery and majority underwent emergency LSCS (90%). Further, of the 72 emergency LSCS deliveries, 52.78% were indicated for labour and spontaneous labour was noted in 47.22% (Table 1).

Of the 101 women who underwent spontaneous labour, established preterm was the commonest condition noted in 49.5% of the women and symmetrical IUGR was the commonest comorbid condition for induction (13.16%). Among the eight women who underwent elective LSCS, gestational diabetes mellitus was the commonest comorbid condition (37.50%) (Table 2a and 2b).

Table 3 shows co-morbid conditions of Emergency LSCS preterm births. It was observed that, fetal distress was the commonest co-morbid condition noted in 40.28% of the women.

**Table.1** Distribution of preterm births according to labour and mode of delivery

Spontaneous / Indicated		Distribution (n=161)		
		Number	Percentage	
Spontaneous	Vaginal delivery	67	66.34	
	Emergency LSCS	34	33.66	
	<i>Total</i>	<i>101</i>	<i>62.73</i>	
Indication	Emergency LSCS	14	23.34	
	Induced	Vaginal	14	36.84
		Emergency LSCS	24	63.16
	<i>Total</i>	<i>38</i>	<i>63.33</i>	
	Elective	LSCS	8	13.33
<i>Total</i>		<i>60</i>	<i>37.27</i>	
<b>Total</b>		<b>161</b>	<b>100.00</b>	

**Table.2a** Co-morbid conditions of spontaneous labour

Co-morbid conditions	Distribution (n=101)	
	Number	Percentage
Established preterm	50	49.50
PPROM	30	29.70
VBAC	5	4.95
IUGR	5	4.95
Breech	4	3.96
Pregnancy induced hypertension	2	1.98
Rheumatic heart disease	2	1.98
Eclapmsia	1	0.99
Abruption	1	0.99
Chorioamnionitis	1	0.99

*Multiple conditions hence total not shown*

Post partum eclampsia and eclampsia were noted among 1.24% of the women each. Among the two women who had complications of post partum eclampsia, both women had induced labour and vaginal delivery. Induction was done due to severe pre-eclampsia. One women who was obese, aged 28 years presented at 34 weeks gestation delivered low birth weight baby (1.6 Kgs) who's APGAR score was normal but required NICU admission for

the duration of 11 days. Of the two women who had eclampsia, the first women was aged 20 years, primi para with 34 weeks of gestational age had spontaneous onset of labour but underwent emergency LSCS and delivered female baby with 1.5 kg birth weight with APGAR score of 5 at one minute and 4 at five minutes having complications of low birth weight, feeding difficulties, hypoglycaemia and sepsis and admitted to NICU for a period of 18 days.

**Table.2b** Co-morbid conditions of induced preterm births

Co-morbid conditions	Distribution (n=38)	
	Number	Percentage
Symmetrical IUGR	5	13.16
Asymmetrical IUGR	4	10.53
Pregnancy induced hypertension	3	7.89
Gestational diabetes mellitus	3	7.89
PLSCS	2	5.26
Complete HELLP	2	5.26
IUGR	2	5.26
Non reassuring CTG	2	5.26
Uncontrolled hypertension	2	5.26
Macrosomia	2	5.26
Failed induction	1	2.63
Bad obstetric history	1	2.63
Polyhydramnios	1	2.63
Gestational hypertension	1	2.63
Absent diastolic flow	1	2.63
Non progress of labour	1	2.63
Oligohydramnios	1	2.63
Rheumatic heart disease	1	2.63
Abruption	1	2.63
DIC	1	2.63
Thrombocytopenia	1	2.63

*Multiple conditions hence total not shown*

The second woman was aged 27 years, primi para with 35 weeks of gestational age presented with moderate anaemia (Hb 7.5 gm%) had spontaneous onset of labour and underwent vaginal delivery. The weight of the baby was 1.8 kg with APGAR score of 4 at one minute but 7 at five minutes and was admitted to NICU for a period of 4 days for observation.

Most of the babies (41.61%) had birth weight between 1.51 to 2.00 Kgs. The mean birth weight was noted as  $2.19 \pm 0.48$  Kgs (Graph 1). Further, 45.45% of the babies weighed between 2.01 to 2.50 Kgs in women who had spontaneous labour and 35% induced labour (Table 4).

APGAR score at one minute was less than seven in 55.28% of the babies and the mean APGAR score was  $6.5 \pm 0.7$ . Most of the babies had APGAR score of 7 or more in women who had spontaneous (52.48%) while in those who had induced labour 60% of the babies each had APGAR score of 7 or more (60%). APGAR score at five minutes was less than seven in 2.48% of the babies and the mean APGAR score was  $7.9 \pm 0.7$  and majority of the babies had APGAR score of 7 or more in women who had spontaneous (96.04%) labour and induced labour (100%) (Figure 1)

The NICU admissions were noted in

52.17% of the babies while KMC was advised in 12.42%. The commonest indication for NICU admission was low birth weight (60.71%) followed by hyperbilirubinemia (14.29%). In babies who had birth weight between 2.01 to 2.50 Kgs, hyperbilirubinemia (8.96%) was the

commonest cause of NICU admission followed by low birth weight (7.46%). In the present study Maximum NICU admission were noted in babies with gestational age of 34 weeks (66.67%) followed by 35 weeks (48.94%) and 36 and above weeks (45.83%) (Table 5).

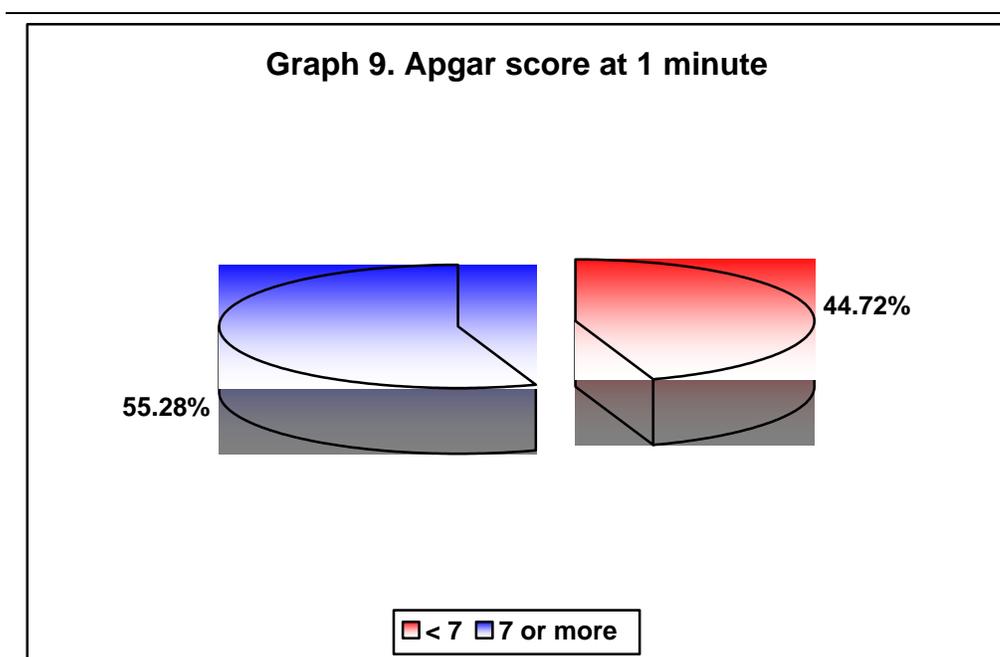
**Table.3** Co-morbid conditions of Emergency LSCS preterm births

Co-morbid conditions	Distribution (n=72)	
	Number	Percentage
Fetal distress	29	40.28
Previous LSCS	15	20.83
Pregnancy induced hypertension	9	12.50
Breech	7	9.72
IUGR	7	9.72
Gestational diabetes mellitus	4	5.56
Placenta praevia	4	5.56
Gestational diabetes mellitus	4	5.56
Decreased fetal movement	4	5.56
PLSCS 2	3	4.17
Non progress of labour	3	4.17
Macrosomia	2	2.78
Malpresentation (Compound / Oblique)	2	2.78
Oligohydramnious	2	2.78
GDM	2	2.78
Precious pregnancy	2	2.78
Uncontrolled hypertension	2	2.78
Bad obstetric history	2	2.78
Eclampsia	1	1.39
Abruption	1	1.39
PPROM	1	1.39
Scar dehiscence	1	1.39
Right kidney PUJ obstruction	1	1.39
Failed induction	1	1.39
Chorioamnionitis	1	1.39
RH Isoimmunization	1	1.39
CPD	1	1.39

*Multiple conditions hence total not shown*

**Table.4** Birth weight and labour

Birth weight (Kgs)	Labour			
	Spontaneous (n=101)		Induced (n=60)	
	Number	Number	Percentage	Percentage
1.0 to 1.5	4	3.96	5	8.33
1.51 to 2.0	39	38.61	18	30.00
2.01 to 2.50	46	45.54	21	35.00
2.51 to 3.0	9	8.91	9	15.00
> 3.0	3	2.97	7	11.67
<b>Total</b>	<b>101</b>	<b>100.00</b>	<b>60</b>	<b>100.00</b>



**Table.5** Distribution of babies according to gestational age and NICU admission

Admission	34 weeks		35 weeks		36 and above	
	No.	%	No.	%	No.	%
NICU	28	66.67	23	48.94	33	45.83
Ward admissions	14	33.33	24	51.06	39	54.17
<b>Total</b>	<b>42</b>	<b>100.00</b>	<b>47</b>	<b>100.00</b>	<b>72</b>	<b>100.00</b>

Low birth weight was the commonest cause for NICU admission in 45.24% of babies with gestational age 34 weeks, 31.91% with 35 weeks and 23.61% with gestational age of 36 and above. It was

observed that, most of the babies born at 34 weeks weighed between 1.51 to 2.0 Kgs (42.86%) and in those who were born during 35<sup>th</sup> week, most of the babies had birth weight between 2.01 to 2.50 Kgs

(48.94%) and the same pattern of birth weight was noted in babies who were delivered at 36 weeks (41.67%) (Table 6). The mortality was observed in five babies accounting to 5.95%. Of these, three babies had low birth weight and two babies had congenital heart disease.

It is postulated that, in compared with term infants, late preterm infants are physiologically less matured and have limited compensatory responses to the extra-uterine environment. Even though late preterm infants are the largest subgroup of preterm infants, there has been little research on this group until recently. The main cause of having less research on late preterm is because of labeling them as “near-term”, thus they are being looked upon as “almost mature,” with little need to be concerned. This study was aimed to find the relation between mode of delivery and perinatal outcome and to identify and evaluate the indications (spontaneous/medical/elective) and the maternal causes for late preterm labour.<sup>5</sup>

Neonates born between 34 and 36 weeks of gestation (late preterm or near term births) comprise 71% of all preterm births in the United States.<sup>7</sup> A recent study<sup>8</sup> from Kerala, India reported that, 8.9% of the 1295 babies were born late preterm during the study period (18 months) while a study<sup>5</sup> from Hyderabad which reported that, of the 3300 live births, 371 (11.24%) were late preterm during study period. In the present study the incidence of late preterm birth was found to be 9.49% for a period of four months which was comparable with a study<sup>8</sup> from Kerala India. Also the incidence of late preterm birth among preterm babies was found to be 61.68% which was comparable with the statistics from United States.<sup>7</sup>

In the present study the commonest age group was found to be 22 to 25 years comprised of 34.78% and the mean age was  $24.54 \pm 4.18$  years. Most of the women (62.11%) belonged to socio economic class III of modified B. G. Prasad's Classification<sup>6</sup> and 70.19% of the women were housewives while 29.81% were working. Majority of the women (72.67%) had body mass index between 25.01 to 30.00 Kg/m<sup>2</sup> and the mean body mass index was noted as  $26.99 \pm 2.85$  kg/m<sup>2</sup>. With regard to obstetric history, more than half (52.8%) of the women were primi para and 3.11% of women had history of previous preterm delivery. Considering the births occurring prior to 37 weeks of gestation, the relative role of pregnancy specific complications to the overall burden of preterm birth has been well documented. But, because the causes of preterm labor alter with advancing gestational age, the distribution of preterm birth also differs with differing gestational ages.<sup>4</sup>

Another study<sup>10</sup> reported that, compared with births < 34 weeks, late preterm births are more likely to be the result of spontaneous idiopathic preterm labor or PPRM than medical or pregnancy indications. The ACOG Clinical management guidelines for obstetrician-gynecologist for the management of preterm labor estimates that the relative distribution of etiologies of preterm birth < 34 weeks' gestation is 30% indicated, 30% PPRM, and 40% spontaneous preterm labor whereas, for late preterm births, the relative distribution of etiologies changes to 20% indicated, 25% PPRM, and 55% preterm labor.<sup>9</sup> The same was true in the present study also where labour was indicated in 37.27% of the women while in 62.73% it was spontaneous and established preterm (spontaneous

idiopathic preterm labour) was the commonest condition responsible for spontaneous labour (49.5%).

A similar study<sup>9</sup> showed that, a larger proportion of late preterm births are due to spontaneous preterm labor (two-thirds) compared with PPROM (one-third). The findings of the present study were consistent with this hypothesis as almost two thirds of the women in this study had spontaneous labour (62.73%) while the labour was indicated in almost one third women (37.27%). A study<sup>10</sup> from Ohio reported that, the causes of indicated late preterm births are similar to that for all preterm births, including preeclampsia (46%), fetal indications (18%), placental abruption (14%), and other indications (20%). In our study IUGR was the commonest comorbid condition for induction (13.16%). There were 8 women who underwent elective LSCS and gestational diabetes mellitus was the commonest comorbid condition (37.50%). Fetal distress was the commonest comorbid condition noted in 40.28% of the women for emergency LSCS.

In the present study, most of the babies (41.61%) had birth weight between 1.51 to 2.00 Kgs and mean birth weight was noted as  $2.19 \pm 0.48$  Kgs. The APGAR score at one minute was less than seven in 55.28% of the babies with mean APGAR score of  $6.5 \pm 0.7$  but, at five minutes only 2.48% of the babies has same score and there was increase in mean APGAR score ( $7.9 \pm 0.7$ ). A review from Cincinnati<sup>4</sup> published summary of neonatal morbidities reported at gestational ages ranging from 34 to 37 weeks. The 34- to 35-week groups have increased rates of RDS, sepsis, and patent ductus arteriosus (PDA). Also there were relatively high (16.3%) rates of admission to neonatal intensive care unit (NICU) at

34 weeks of gestation whereas this rate decreased to 4.8% by 36 weeks of gestation.

Moreover, studies from United States reported the number of NICU admissions varied extensively according to the type of facility.<sup>11,12</sup> There was not overall difference in the incidence of conditions like intracranial hemorrhage or necrotizing enterocolitis; however the rate of these complications was exhibited low throughout the late preterm period. However, in this study the commonest cause of NICU admission was low birth weight followed by hyperbilirubinemia and RDS. The rate of NICU admission was 52.17%, while KMC was advised in 12.42%. Also pattern of NICU admission observed in babies with 34, 35 and 36 weeks was comparable that is, maximum NICU admissions were noted in babies with gestational age of 34 weeks (66.67%). The mortality was noted in five babies (5.95%) and the causes were low birth weight (Three babies) and congenital heart disease (Two babies).

A prospective cohort study<sup>5</sup> done in Hyderabad reported that 257 (70.8%) out of 363 late preterm infants had at least one of the predefined condition of neonates. Late preterm infants were in significantly higher risk for overall morbidity due to various cause, jaundice, hypoglycaemia, respiratory morbidity, any ventilation (non invasive or invasive) and probable sepsis. The incidence of morbidities decreased from 87.9% at 34 weeks to 67.5% at 36 weeks respectively. The study concluded that late preterm infants are at high risk compared with term infants for respiratory morbidity, jaundice, hypoglycaemia, need of ventilation (non invasive or invasive) sepsis, and probable sepsis.

The findings of the present study were comparable with the study<sup>5</sup> conducted by Jaiswel et al as the morbidity was noted among almost two third babies including 52.17% NICU admissions 12.42% required KMC. The commonest indication for NICU admission was low birth weight (60.71%) followed by hyperbilirubinemia (14.29%). The commonest indication for NICU admission in babies who had birth

weight between 2.01 to 2.50 Kgs was hyperbilirubinemia (8.96%) followed by low birth weight (7.46%). The limitation of the study was that, the study population was derived from tertiary care referral centre where considerable proportions of high risk mothers are referred for antenatal problems. Hence, a higher incidence of morbidities may be observable in the late preterm population.

**Table.6** Distribution of babies according to gestational age and complications / reasons for NICU admission

Complications / Reasons	34 weeks		35 weeks		36 and above	
	No.	%	No.	%	No.	%
Low birth weight	19	45.24	15	31.91	17	23.61
Hyperbilirubinemia	1	2.38	5	10.64	6	8.33
RDS	2	4.76	2	4.26	1	1.39
Death	1	2.38	1	2.13	3	4.17
Hypoglycaemia	1	2.38	0	0.00	2	2.78
Intrauterine growth retardation	0	0.00	0	0.00	3	4.17
Congenital heart disease	0	0.00	1	2.13	1	1.39
MAS	0	0.00	0	0.00	1	1.39
Feeding difficulties	1	2.38	0	0.00	0	0.00
Sepsis	1	2.38	0	0.00	0	0.00
Observation	6	14.29	1	2.13	3	4.17

The incidence of late preterm birth was calculated to be 9.49% and rate of late preterm births among preterm babies was calculated as 61.68%. Most of late preterm births had spontaneous labour (62.73%) due to the risk of spontaneous idiopathic established preterm. Preterm births were responsible for LSCS in almost half of the study population (49.68%) with majority of emergency LSCS deliveries (90%). The late preterm births required induction due the risk of IUGR and resulted in emergency LSCS in cases of fetal distress

and previous LSCS. The late preterm births also resulted from indicated elective LSCS due to fetal indication with commonest cause being GDM. With regard to neonatal outcome, babies had low birth weight (60.71%) which further resulted in complications such as hyperbilirubinemia (14.29%) leading to higher rate of NICU admission being 52.17%. The incidence of morbidities decreased from 66.67% at 34 weeks to 45.83% at 36 weeks respectively. The perinatal mortality rate was 5.95% with

causes being low birth weight and congenital heart disease.

Late preterm births being a large sub-group of preterm, often known as near term makes significant impact on perinatal outcome at each week of gestation 34, 35 and 36 weeks 6 days respectively. Hence the burden of managing late preterm births needs judicious decision making to reduce the burden on NICU.

### **Acknowledgement**

The authors would like to thank The Principal, Jawaharlal Nehru Medical College, Belgaum for permitting us to carry out the study. The authors would also like to thank Head of the Department, Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College, Belgaum for allowing us to utilize the infrastructure needed. Further the authors and thankful the pregnant women who participated in this study.

### **References**

1. Goldenberg RL. The management of preterm labor. *Obstet Gynecol* 2002;100(5 Pt 1):1020-37.
2. Mathews TJ, Menacker F, MacDorman MF. Infant mortality statistics from the 2002 period: linked birth/infant death data set. *Natl Vital Stat Rep* 2004;53:1-29.
3. Davidoff MJ, Dias T, Damus K, Russell R, Bettegowda VR, Dolan S, et al. Changes in the gestational age distribution among U.S. singleton births: Impact on rates of late preterm

- birth, 1992 to 2002. *Semin Perinatol* 2006;30:8-15.
4. Loftin RW, Habli M, Snyder CC, Cormier CM, Lewis DF, DeFranco EA, et al. Late Preterm Birth *Rev Obstet Gynecol* 2010; 3(1):10–9.
5. Jaiswal A, Murki S, Gaddam P, Reddy A. Early Neonatal Morbidities in Late Preterm Infants. *Indian Pediatr* 2011;48(8):607-11.
6. Kulkarni AP, Baride JP. *Textbook of Community Medicine*, 1<sup>st</sup> Ed. Mumbai; Vora Medical Publications: 1998.
7. National Center for Health Statistics, authors. 2003 final natality data. Data prepared by March of Dimes Perinatal Data Center. 2005
8. Wagh AS, Jain N. Comparison of neonatal morbidities of late preterm with term born babies. *Journal of Pharmaceutical and Biomedical Sciences (JPBMS)* 2012;15(9):1-6
9. Tucker JM, Goldenberg RL, Davis RO, Copper RL, Winkler CL, Hauth JC. Etiologies of preterm birth in an indigent population: is prevention a logical expectation? *Obstet Gynecol* 1991;77:343–7.
10. Merlino A, Bailit J, Mercer BM. Indications for late preterm birth, can obstetricians make a difference? *Am J Obstet Gynecol* 2008;199 (suppl 6A): S234.
11. Committee on Obstetric Practice. ACOG committee opinion No. 404 April 2008. Late-preterm infants. *Obstet Gynecol* 2008;111:1029–32.
12. Singh U, Singh N, Seth S. A prospective analysis of etiology and outcome of preterm labor. *J Obstet Gynecol India* 2007;57(1):48-52.