

Original Research Article

A prospective study on the effects and prevalence of maternal, fetal and placental risk factors on low birth weight neonates

Raghul Jayaseelan, Chidambaranathan Sivaprakasam*, Logesvar Palanisamy

Department of Paediatrics, Rajah Muthiah Medical College, Chidambaram, Tamil Nadu, India

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*Correspondence:

Dr. Chidambaranathan Sivaprakasam,
E-mail: cdnathan@gmail.com

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ABSTRACT

Background: Maternal, foetal and placental risk factors have a causative effect in the prematurity and failure to thrive in the early infantile period. Timely diagnosis helps in the anticipation of complications specific to risk factors and managing by impairing their harmful effects on the growth and development of the baby.

Methods: The study was conducted prospectively in Department of Paediatrics, Rajah Muthiah Medical College and Hospital, Chidambaram from January 2018 to June 2018. 361 Low birth weight babies were included. Neonates (n=361) weighing less than 2.5 kilograms with parental informed consent are included, whereas those with severe congenital anomaly, systemic disease or infection were excluded from the study. Various known maternal, placental and foetal risk factors are observed during the course of the study. The gestational age of the neonates was estimated using modified Dubowitz scoring. Other factors like mode of delivery of the babies were also noted. Statistical analysis (descriptive statistics) was done by using Microsoft Word 2010.

Results: Out of 1040 babies born from January to July 2018, 341 babies weight less than 2.5 kg. Out of which 162 (44.88%) babies were born preterm. Of the full term births 52% were low birth weights. The risk factors of the neonates are not mutually exclusive. In the present study 28 maternal risk factors were studied. The prevalence of maternal, fetal and placental risk factors was 85.32%, 74.79% and 6.65% respectively.

Conclusions: Period prevalence of low birth weight babies and prematurity is 34.71% and 15.58% respectively. Risk factors are not independent to each other with maternal and foetal risk factors have almost have an effect on nearly three fourths of low birth weight neonates.

Keywords: Dubowitz scoring, Low birth weight, Linear growth, Weight gain

INTRODUCTION

Neonatal mortality rate occupies a major portion of infant mortality rate.¹ This is attributed to special problem among neonates, especially congenital anomalies, respiratory tract infections, acute diarrhoeal diseases and skin infections.² The increased rate of infections is due to immature immune system and poor functions of integumentary system when compared to those functions in the adults. However, these functions are even more impaired especially in the preterm infants. Preterm

biology is unique and considered as an equivalent to immune-compromised state despite it is their normal physiology.³ Newer advancements in neonatology and foetal medicine aids in the better delivery of health care thereby reducing the neonatal fatality due to prematurity.⁴ Maternal, foetal and placental risk factors have a causative effect in the prematurity and failure to thrive in the early infantile period.⁵ These factors either independently or harmoniously with other variables have a deleterious effect on the early part of first year of life.⁶ Timely diagnosis helps in the anticipation of

complications specific to risk factors and managing by impairing their harmful effects on the growth and development of the baby.⁷

METHODS

The study was conducted prospectively in Department of Paediatrics, Rajah Muthiah Medical College and Hospital, Chidambaram from January 2018 to June 2018.

361 Low birth weight babies were included. Neonates (n=361) weighing less than 2.5 kilograms with parental informed consent are included, whereas those with severe congenital anomaly, systemic disease or infection were excluded from the study.

Various known maternal, placental and foetal risk factors are observed during the course of the study. The gestational age of the neonates was estimated using modified Dubowitz scoring. Other factors like mode of delivery of the babies were also noted. Statistical analysis (descriptive statistics) was done by using Microsoft word 2010.

RESULTS

A prospective study was conducted at NICU, RMMCH from January 01.01.2018 to 30.06.2018. A total of 361 low birth weight babies were included in the present study. Out of which term babies were 199 and pre-term babies were 162.

Table 1: Distribution of low birth weight babies in the present study.

Term	Preterm
199	162

Table 2: Classification of low-birth weight babies with respect to gestational age.

Dubowitz score	No. of low birth weight babies
28-30 weeks	11
30-32 weeks	18
32-34 weeks	32
34-36 weeks	101
36-38 weeks	199

Table 3: Distribution of low birth weight babies with respect to maternal risk factors.

Maternal risk factors	Preterm		Term		Total	
	(n)	(%)	n	%	n	%
Anemia	2	.5	11	85	13	3.6
Pregnancy induced hypertension	9	2.4	17	4.7	26	7.2
Gestational diabetes	6	1.65	9	2.4	15	4.1
Hypothyroid	8	2.2	10	2.7	18	4.9
Eclampsia	1	.2	2	.55	3	.83
Pre-eclampsia	5	1.3	4	1.1	9	2.4
Seizure disorder	-		1	.27	1	.22
Varicella	-		1	.27	1	.27
HBsAg positive mother	1	.2	-		1	.27
TORCH infections	1	.2	-		1	.22
Oligohydraminos	26	7.2	53	14.6	79	21.88
Prolonged rupture of membranes	19	5.2	23	6.4	42	11.63
Chronic hypertension	3	.8	1	.2	4	1.1
Cervical fibroid	1	.2			1	.2
Short primi	2	.5	1	.2	3	.83
Rh negative	2	.5	5	1.3	7	1.9
Breech	2	.5	3	.8	5	1.3
Polyhydraminos	6	1.6	14	3.8	20	5.5
Heart disease	-		3	.8	3	.83
Asthma	1	.21	2	.8	3	.83
Teenage pregnancy	1	.21	-	.2	1	.2
Overt Diabetes	2	.5	1	.8	3	.83
VDRL positive mother	-		1	.2	1	.2
Infertility	4	1.1	-	.3	4	1.1
Renal calculi	-		1	.2	1	.2
UTI	1	.2	1	.25	2	.55
Pulmonary tuberculosis	1	.2	-	.2	1	.2
Lower respiratory infections	1	.2	2	.3	3	.83

During the study period, 1040 babies were born in which 361 babies low birth weight babies were included in the study. Period prevalence of low birth weight babies is 34.71%.

Table 4: Birth weight distribution among neonates.

Birth weight (Kg)	Preterm		Term	
	No.	%	No.	%
Extremely LBW (<1000 gms)	7	1.9		
Very LBW (1001-1500 gms)	22	16		
LBW (1501 - 2500 gms)	142	39	190	52

In present study, 199 babies were present in 36-38 weeks, 101 babies were present in 34-36 weeks, 32 babies were present in 32-34 weeks, 18 babies were present in 30-32 weeks, 11 babies were present in 28-30 weeks. In the present study a total of 29 maternal risk factors were studied. Out of which oligohydramnios was the common maternal risk factor (79) followed by previous lscs (49) prolonged rupture of membranes (42). Out of which 162 (44.88%) babies were born preterm.

Table 5: Distribution of low birth weight babies with respect to foetal placental risk factors.

Placental risk factors	Pre-term		Term		Total	
Placenta previa	2	0.55	10	2.77	12	3.32
Abruptio placenta	4	1.11	1	0.28	5	1.39
Fetoplacental insufficiency	2	0.55	5	1.39	7	1.94
Fetal risk factor	Pre-term		Term		Total	
Pre-term	158	43.77	0	0.00	158	43.77
IUGR	0	0.00	48	13.30	48	13.30
VLBW	32	8.86	0	0.00	32	8.86
Twin	19	5.26	5	1.39	24	6.65
Congenital defects	5	1.39	2	0.55	7	1.94
Torch infections	1	0.28	0	0.00	1	0.28

Among the preterm babies, the prevalence of extreme, early and late preterm was 30.47% (n=11), 13.85% (n=50) and 27.98% (n=101). In the present study, twenty-eight risk factors were analyzed. The risk factors of the neonates are not mutually exclusive. The prevalence of maternal, fetal and placental risk factors was 85.32%, 74.79% and 6.65% respectively with their distribution in the Table 3.

DISCUSSION

UNICEF's data implies that about 28% of babies of India are born low in birth weight. In India 6 to 8 million low birth weights are yearly. Of these 7.5 million babies, 60% are born at term with foetal growth retardation while the remaining 40% are born pre-term. Action report on

preterm birth in India 2013 documented that the country accounted for 3.6 million viz., 24% of global pre-term births. India tops the list of 10 nations contributing around 60% of premature deliveries.⁸ In a study conducted by Ahankari et al the hospital in births was compiled from 1st January 2014 to 2017 with 655 live births, out of which 6.1% were pre-term deliveries. Of the full-term births, 13.8% were low birth weights. The odds of both pre-term delivery and low birth weight were reduced in multigravida compared with primigravida women regardless of age.

Anemia was prevalent in 91% of women tested. The odds of preterm delivery and low birth weight were much higher in mother under 22 years of age in the rural Indian population.⁹ In a study conducted by lei et al in china, a cross sectional study was carried out in china in 2013. And a total of 28045 singleton live infants and their mothers were recruited using sampling method. Among 2845 women of childbearing age surveyed, all showed that the birth weight of newborns whose mother had suffered from PIH during pregnancy was significantly lower than those whose mothers had not suffered from PIH. The present cross-sectional study indicated that PIH had an effect on neonatal birth weight.¹⁰

In a study conducted by Chaitanya et al, a hospital based prospective study comprising 790 pregnant women visiting the obstetrics clinic for a routine antenatal check-up and genito-urinary infections. Rates of preterm birth and low birth weight in the study population were 7.6%, 11.4% respectively. Previous pre-term delivery, periodontitis, oligohydramnios, gestational diabetes mellitus and maternal short stature were risk factors for pre-term birth, while periodontitis, gestational hypertension and genital infection during the later stages of pregnancy were the independent risk factors for low birth weight.

In another study, the intervention was a daily snack made from green leafy vegetables, fruit and milk and micronutrient vegetables. Of 6513 women randomly assigned 2291 women were pregnant, 1962 women delivered live singleton newborns and 1360 newborns were measured. In 1094 newborns whose mothers started supplementation > 90 days before pregnancy, birth weight was higher in the treatment group.¹¹

CONCLUSION

Period prevalence of low birth weight babies and prematurity is 34.71% and 15.58% respectively. Risk factors are not independent to each other with maternal and foetal risk factors have almost have an effect on nearly three fourths of low birth weight neonates.

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REFERENCES

1. Ouyang F, Parker M, Cerda S, Pearson C, Fu L, Gillman MW, et al. Placental weight mediates the effects of prenatal factors on fetal growth: the extent differs by preterm status. *Obesity*. 2013;21(3):609-20.
2. Leung JC, Cifra CL, Agthe AG, Sun CCJ, Viscardi RM. Antenatal factors modulate hearing screen failure risk in preterm infants. *Arch Dis Child Fetal Neonatal Ed*. 2016;101(1):F56-61.
3. Kunjunju AM, Gopagondanahalli KR, Chan Y, Sehgal A. Bronchopulmonary dysplasia-associated pulmonary hypertension: Clues from placental pathology. *J Perinatol*. 2017;37(12):1310-4.
4. Kazzi SNJ, Jacques SM, Qureshi F, Quasney MW, Kim UO, Buhimschi IA. Tumor necrosis factor- α allele lymphotoxin- α +250 is associated with the presence and severity of placental inflammation among preterm births. *Pediatr Res*. 2004;56(1):94-8.
5. Harteman JC, Nikkels PGJ, Kwee A, Groenendaal F, De Vries LS. Patterns of placental pathology in preterm infants with a periventricular haemorrhagic infarction: association with time of onset and clinical presentation. *Placenta*. 2012;33(10):839-44.
6. Chiarelli S, Zanardo V, Ouyang F, Parker M, Cerda S, Pearson C, et al. Perinatal factors associated with the neurologic impairment of children born preterm. *Obstet Gynecol*. 2008;101(1):553-7.
7. Zanardo V, Vedovato S, Suppiej A, Trevisanuto D, Migliore M, Di Venosa B, et al. Histological inflammatory responses in the placenta and early neonatal brain injury. *Pediatr Dev Pathol*. 2008;11(5):350-4.
8. Viscardi RM, Muhumuza CK, Rodriguez A, Fairchild KD, Sun CCJ, Gross GW, et al. Inflammatory markers in intrauterine and fetal blood and cerebrospinal fluid compartments are associated with adverse pulmonary and neurologic outcomes in preterm infants. *Pediatr Res*. 2004;55(6):1009-17.
9. Ahankari A, Bapat S, Myles P, Fogarty A, Tata L. Factors associated with preterm delivery and low birth weight: a study from rural Maharashtra, India. *F1000Research*. 2017;6.
10. Lei F, Liu D, Shen Y, Zhang L, Li S, Liu X, et al. Study on the influence of pregnancy-induced hypertension on neonatal birth weight. *J Investig Med*. 2018;66(6):1008-14.
11. Tellapragada C, Eshwara VK, Bhat P, Acharya S, Kamath A, Bhat S, et al. Risk factors for preterm birth and low birth weight among pregnant Indian women: A hospital-based prospective study. *J Prev Med Public Heal*. 2016;49(3):165-75.

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