

Original Research Article

A study of survival of very low birth weight neonates in a tertiary care hospital

Rajendra Shinde¹, Kiran Haridas^{2*}, Pritesh Nagar³, Hemant Parakh³

¹Department of Pediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India

²Department of Pediatrics, NRHM, Gulbarga, Karnataka, India

³Department of Pediatrics, Aditya Hospital, Hyderabad, Telangana, India

Received: 12 February 2019

Accepted: 16 February 2019

*Correspondence:

Dr. Kiran Haridas,

E-mail: kkiranharidas@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Preterm birth is one of the major clinical problems in Obstetrics and Neonatology as it is associated with perinatal mortality, serious neonatal morbidity and in some cases childhood disability. Very low birth weight (VLBW) neonates comprise between 4-8% of live-births but about one-third of deaths during the neonatal period occur in this group of newborns. Data on the probability of survival of infant in high risk pregnancies can be of great value in guiding management. The objective is to study the survival at discharge of VLBW neonates admitted in a tertiary care hospital.

Methods: Retrospective observational study of all VLBW infants admitted in Aditya Hospital NICU over 3 years between 1-7-2011 to 30-6-2014. Descriptive and inferential statistical analysis has been carried out in the present study.

Results: In the present study maternal PROM was seen in 32.9% of cases, Preeclampsia in 31.7% of cases which constituted the most important antenatal risk factor for VLBW followed by multiple gestations in 25.2%. Common morbidities in VLBW neonates are Neonatal jaundice, Probable sepsis, Apnea of prematurity and RDS. Survival improved with increasing gestational age and weight.

Conclusions: Birth weight and gestational age specifically predicts survival of preterm VLBW babies, facilitating decision making for obstetricians, neonatologists and parents. In the present study total survival rate was 86.6% with a mortality of 13.4%.

Keywords: PROM-premature rupture of membrane, RDS-respiratory distress syndrome, VLBW-very low birth weight

INTRODUCTION

Preterm birth is one of the major clinical problems in Obstetrics and Neonatology as it is associated with perinatal mortality, serious neonatal morbidity and in some cases childhood disability. It is reported that 60-80% of all neonatal mortality and morbidity is due to preterm birth. Very low birth weight (VLBW) neonates comprise between 4-8% of live-births but about one-third

of deaths during the neonatal period occur in this group of newborns.¹

During the last two decades the survival of VLBW neonates has significantly increased due to advances in management and improvement in the care of high risk babies, introduction of NICU in 1960, regionalization of perinatal care in 1970's, introduction of surfactant therapy in 1980's. Survival rate of preterm babies with

lower birth weight is reported to have increased from 10% to 50-60%.²

The survivors of VLBW neonates especially when born less than 1000g require to remain in newborn intensive care units (NICU). They need to spend time in NICU till close to term to allow for sufficient multi-organ maturation resulting in prolonged hospital stay for both mother and infant.

Conditions that make the uterus an unfavorable environment for fetal development may result in growth restriction and physiological adaptations to the sub optimal intra uterine environment may be important in determining the health and survival of fetus and the newborn infant. The highest prevalence of VLBW deliveries is observed in Africa and south east Asia. The incidence of VLBW infants is same but the percentage of survival is increasing due to advance in perinatal care. The survival rate ranges between 43% in developing countries like Jamaica to more than 90% in developed world like Netherlands, its 63% in India.³

The etiology of very low birth weight is multifactorial, prematurity and low socioeconomic status of mother being a major cause. Care of the newborn weighing less than 1500g remains a challenge to Neonatologist. Babies with birth weight <1500g are at more risk of development of neonatal complications and its long term sequelae. Resuscitation is required in more than 30% of these newborns.⁴ After being born, VLBW's need special care because of the associated complications. Premature babies can have problems with virtually every system of the body because of immaturity of all the systems. One of the most common problem is respiratory distress syndrome. The other common problem is that these babies have poor immune system and develop neonatal sepsis more frequently than term babies. So, prevention of preterm labor, prophylactic pharmacologic therapy to prolong gestation, tocolytic therapy when indicated and systematic maternal and fetal surveillance and patient education will go a long way in improving outcome of VLBW infants.

Data on the probability of survival of infant in high risk pregnancies can be of great value in guiding management. This information can help both clinical staff and parents to decide if and when to intervene in high risk pregnancies. Thus authors aimed to identify risk factors leading to VLBW birth and to produce birth weight and gestational age (GA) specific survival rates.

METHODS

A retrospective observational study of all VLBW neonates admitted in Aditya Hospital NICU, Hyderabad was done from July 2011 to June 2014. Medical record of VLBW babies weighing <1500g at Aditya Hospital during the study period was obtained from the Medical Records Department.

Inclusion criteria

- All live born very low birth weight babies (<1500g) admitted in Aditya Hospital within 24 hours of delivery.

Exclusion criteria

- Babies with lethal congenital anomalies
- Babies who are discharged against medical advice.

The study was conducted at the Neonatal Intensive Care Units of Aditya Hospital. A total of 160 VLBW neonates were admitted over 3 years, out of which 66 VLBW neonates were excluded as they were hospitalized after 24 hours of life and 12 neonates were excluded as they were taken out against medical advice.

A total of 82 VLBW babies with a gestational age between 23 to 36 weeks were included in the study. The detailed case records of the mother and neonates were obtained from the available case records. The maternal details like antenatal profile, medical complications during pregnancy, definite cause of preterm labor if any, treatment profile, intranatal care and delivery outcome were noted.

Mother's case records were checked for high risk factors leading to premature delivery like anemia, pregnancy induced hypertension, eclampsia, ante-partum hemorrhage, PROM, history of preterm birth in previous pregnancies, multiple gestations, polyhydramnios and oligohydramnios. History regarding administration of antenatal steroids was also taken.

RESULTS

Total of 1761 neonates were admitted over three years hospitalized in Aditya hospital NICU, out of which 160 were VLBW neonates. 78 patients were excluded as 66 of which hospitalized after 24 hours and 12 others were discharged against medical advice by parent's request. In these 82 babies with birth weight less than 1500g and gestational age ranging from 23 to 36 weeks were studied.

This study evaluated all the live born VLBW babies admitted in NICU both inborn and out born. The maternal risk factors leading to VLBW deliveries, perinatal factors contributing for VLBW, and the survival patterns and the factors responsible with survival were noted.

In the present study 52.4% mothers were in 21-25 years age group, 46.3% in 26-30 years age group and 1.2% of mothers were in 31 to 35 years age group. The mean age of the mother was 27.55±3.01. The incidence of very low birth weight was 48.8% in primi and 51.2% in multipara. In the present study 72% patient were delivered by LSCS and 28% were delivered by spontaneous vaginal delivery.

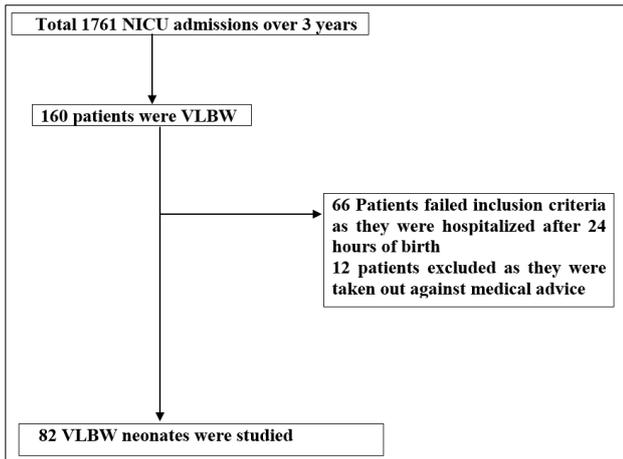


Figure 1: Study flow chart.

In present study 22% of patients were twins, 3.7% were triplets and 74.4 % had singleton type of gestation. In present study 56.1% of VLBW were males and 43.9% of VLBW were females. 63.4% of babies were having weight between 1250-1499g, 22% having weight between 1000-1249g, 13.4% between 750-999g and 1.2% below 750g.

In the present study 12.2% of babies had gestational age between 23 to 28 weeks 76.8% babies between 29 to 34weeks and 11% had gestational age more than 34 weeks (Table 1).

Table 1: Social profile of study population.

| Social profile | No. of patients | % | |
|---------------------|------------------------------|----|------|
| Mother age in years | 21-25 | 43 | 52.4 |
| | 26-30 | 38 | 46.3 |
| | 31-35 | 1 | 1.2 |
| Parity | Primi | 40 | 48.8 |
| | Multi | 42 | 51.2 |
| Mode of delivery | LSCS | 59 | 72.0 |
| | Spontaneous vaginal delivery | 23 | 28.0 |
| Pregnancy | Singleton | 61 | 74.4 |
| | Twin | 18 | 22.0 |
| | Triplet | 3 | 3.7 |
| Gender | Female | 36 | 43.9 |
| | Male | 46 | 56.1 |
| Birth weight | <750 | 1 | 1.2 |
| | 750-999 | 11 | 13.4 |
| | 1000-1249 | 18 | 22.0 |
| | 1250-1499 | 52 | 63.4 |
| Gestational age | 23-28 | 10 | 12.2 |
| | 29-34 | 63 | 76.8 |
| | >34 | 9 | 11.0 |

In the present study PROM was seen in 32.9% of cases, preeclampsia in 31.7% of cases which constituted the most important cause of VLBW in mother followed by multiple gestations in 25.2%.

In the present study 18.3% of babies were appropriate for gestational age and 81.7% of babies were small for gestational age. In the present study, 76% of babies required resuscitation at birth.

In the present study, neonatal hyperbilirubinemia is seen most commonly in VLBW neonates (92.6%) followed by sepsis and RDS. In the present study 86.6% patients survived and 13.4% patients expired (Table 2).

Table 2: Clinical profile of study subjects.

| | | No. of patients | % |
|------------------------|---------------------------------|-----------------|------|
| Gestational maturity | Appropriate for gestational age | 15 | 18.3 |
| | Small for gestational age | 67 | 81.7 |
| Resuscitation required | No | 62 | 75.6 |
| | Yes | 20 | 24.4 |
| Neonatal complications | Neonatal hyperbilirubinemia | 76 | 92.6 |
| | RDS | 34 | 41.4 |
| | Probable sepsis | 44 | 53 |
| | Screen positive sepsis | 31 | 37.8 |
| | Culture positive sepsis | 8 | 10 |
| | Apnea | 36 | 43.9 |
| | Perinatal asphyxia | 5 | 6 |
| | Hypoglycemia | 4 | 4.8 |
| | NEC | 4 | 4.8 |
| | Pulmonary hemorrhage | 3 | 3.6 |
| Outcome | Death | 11 | 13.4 |
| | Survived | 71 | 86.6 |

In the present study survival did not correlate with maternal parity, mode of delivery, gestational age and gender.

In the present study the mortality in female neonates is 13.9% and 13% in male neonate, survival not correlated with gender.

In the present study outcome is 100% in <750g, 36.4% in 750g-999g, 92.6% in 1000-1249 and 95.3% in 1250 to 1499g.

The outcome was found to be statistically significant with birth weight, gestational maturity and administrations of steroids (Table 3).

Table 3: Association of various variables with the outcome of neonates.

| | | Outcome | | p value |
|----------------------|---------------------------------|------------|------------|---------|
| | | Death | Survived | |
| Maternal parity | Primi | 4 (10%) | 36 (90%) | 0.376 |
| | Multi | 7 (16.7%) | 35 (83.3%) | |
| Mode of delivery | LSCS | 6 (10.2%) | 53 (89.8%) | 0.277 |
| | Spontaneous vaginal delivery | 5 (21.7%) | 18 (78.3%) | |
| Gender | Female | 5 (13.9%) | 31 (86.1%) | 1.00 |
| | Male | 6 (13%) | 40 (87%) | |
| Birth weight | <750 | 0 (0%) | 1 (100%) | 0.001 |
| | 750-999 | 7 (63.6%) | 4 (36.4%) | |
| | 1000-1249 | 2 (7.4%) | 25 (92.6%) | |
| | 1250-1499 | 2 (4.7%) | 41 (95.3%) | |
| Gestational age | 23-28 | 5 (33.3%) | 10 (66.7%) | 0.60 |
| | 29-34 | 6 (9.5%) | 57 (90.5%) | |
| | >34 | 0 (0%) | 4 (100%) | |
| Gestational maturity | Appropriate for gestational age | 5 (33.3%) | 10 (66.7%) | 0.025 |
| | Small for gestational age | 6 (9%) | 61 (91%) | |
| Antenatal steroid | No | 10 (31.3%) | 22 (68.8%) | < 0.001 |
| | Yes | 1 (2%) | 49 (98%) | |

In the present study mean gestational age and birth weight of survived patient was 32.82±2.02 weeks and 1278.94±167.5g respectively (Table 4).

Table 4: Mean distribution of birth weight and gestation with outcome.

| Outcome | Gestational age (weeks) | Birth weight (g) |
|----------|-------------------------|------------------|
| Survived | 32.82±2.02 | 1278.94±167.51 |
| Death | 28.36±2.54 | 1008.18±223.06 |

DISCUSSION

The improving prognosis for infants of very low birth weight makes it important to give parents an accurate prediction of outcome of their infants. Thus, authors aimed to provide specific survival rates for very low birth weight babies admitted in present NICU based on birth weight and gestational age.

The incidence of very low birth weight in India is estimated to be 4.5%. (SEAR NPD report 2007-08).⁵ According to SEAR NPD report 2007-08, the incidence of VLBW babies among SEAR countries are as follows: Bangladesh (5.4%), Indonesia (inborn=4.1%, outborn=8%), Nepal (0.9%), Sri Lanka (1.6%), Thailand (11.4%).⁵ According to a study in Europe the incidence of VLBW is 1.6% in their country. Another study in South Africa documented an incidence of 8.8%.^{6,7}

Low birth weight is more common in early and late reproductive life. Birth weight increases with increase in parity up to 5 then it again decreases. A study done by Ballot et al. showed that the incidence of VLBW is more between the age group of 18 and 27 years, with a mean

maternal age of 26.5 years.³ According to study published by Italian collaborative group on preterm delivery mean maternal age for VLBW deliveries was 28±5 years. In present study the mean maternal age was 27.55±3. which is similar to mentioned studies.⁸

According to Ballot et al, 37.3% women with VLBW deliveries were primigravida.³ According to Roy KK et al, 68% of women with VLBW deliveries were primigravida.⁹ In another study conducted by Soothed et al. 51% of women with VLBW deliveries were primiparous.¹⁰

In present study 48.8% were primi and 51.2% VLBW deliveries were seen in multigravida mothers. In present study PROM was an important maternal risk factor, it was associated with 32.9% mothers. This could be because of more no. of multiple gestation in present study. According to Arad I et al. PROM was associated with 18.9% in Inborn NICU mothers and 21.6% mothers in outborn NICU who delivered VLBW babies.¹¹

According to Hagen et al, 17% of mothers with VLBW deliveries had PROM.¹² Distribution of babies based on birth weight in present study were similar to other studies. In present study the majority of babies were between 1000-1499 which was similar to other studies.^{1,10}

Survival rates are more in present study. This may be because, most of the babies are small for gestational age. A similar finding was also noted in a study done by Seyyed et al and Jair et al.^{1,13}

In present study mortality is less in neonates whose mothers received antenatal corticosteroids which is in

comparison with other studies done by Basu S et al, Seyyed et al and Kanya et al, the decrease in mortality is associated with decrease in incidence of RDS.^{1,14,15}

In present study survival in males is 86% and females 87%. In a study conducted by Ballot et al survival is 64.4% in males and 76.5% in females and in Carrie K Shapiro- Mendoza et al survival in males 73.3 and 84.4% in males and females respectively.¹⁶ Survival rate in <750g in present study is more, this is because of small sample size i.e. only one baby in that group and that baby survived, survival in other age group is comparable with Seyyed et al.¹

Mean birth weight was an important variable in survival of VLBW infants. In present study Mean birth weight of infants who survived was 1278.94grams with SD of ± 167.51281 , mean birth weight of VLBW babies who expired was 1008.18 ± 223.06 grams with SD. This is comparable with study done by Seyyed et al.¹ According to Roy KK et al, mortality rates in preterm babies with birth weight less than 1000g was 29.1%, between 1000-1250g was 16.6% and 14.2% between 1251-1500g.⁹

There is a wide variability in survival rate as reported in different centers. This is due to difference in patient population, antenatal care, intranatal care, aggressive neonatal care and availability of NICU facilities

According to Anthony S et al, survivals of VLBW babies was 90% in study done by them in Netherlands.¹⁷ In another study conducted by Kaiser JR et al, in Texas survival of VLBW infants was 81%.¹⁸ In one study by Velaphi SC et al, in South Africa the survival in VLBW babies was 71%.¹⁹ According to Arad I et al, 60.8 % and according to Chien et al, 91% babies survived which is more compared to present study.^{11,20} Among the Indian studies Basu S et al, found the survival rate to be 63%. Roy KK et al, stated 84.2% survival rate for VLBW babies which was similar to present study.⁹ Survival and mortality rates in present study varied with respect to birth weight and gestational age.

CONCLUSION

Birth weight and gestational age specifically predicts survival of preterm VLBW babies, facilitating decision making for obstetricians, neonatologists and parents. Preterm VLBW infants has varying effects in terms of psychological and financial burden on family in developing countries like India. The factors leading to VLBW delivery in developing countries like India are modifiable and preventable.

Recommendations

To improve outcome for outborn babies, high risk pregnancies should be delivered at tertiary care centres. Early use of full course of antenatal steroids and support for regionalized transport teams can further improve

neonatal outcomes. A continuing audit of these measures should be encouraged, and the results should be made available to all health care workers working in obstetrics and neonatology.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Afjeh SA, Sabzehei MK, Fallahi M, Esmaili F. Outcome of very low birth weight infants over 3 years report from an Iranian center. *Iranian J Pediatr.* 2013;23(5):579-87.
2. Goldenberg RL. The management of preterm labour. High risk pregnancy series-an experts view. *Obstet Gynaecol.* 2002;100:1020-34.
3. Ballot DE, Chirwa TF, Cooper PA. Determinants of survival in very low birth weight neonates in a public sector hospital in Johannesburg. *BMC Pediatr.* 2010;10:30.
4. Anita BV, Hinesh M. VLBW Babies-obstetric dilemma and pediatric challenge. *Pravara Med Rev.* 2008;3(4):1-11.
5. South East Asia Regional Neonatal-Perinatal Database. SEAR-NPD; 2007-08.
6. Odendaal ES, Steyn DW, Odendaal HJ. Obstetric causes for delivery of very low- birth-weight babies at Tygerberg Hospital. *SAMJ.* 2003;93(1):61-4.
7. Italian Collaborative Group on Preterm Delivery. Prenatal and postnatal factors affecting short-term survival of very low birth weight infants. *Eur J Pediatr.* 1988;147(5):468-71.
8. EuroNeoStat General report for very low birth weight infants. Data from 2003 to 2006.
9. Roy KK, Baruah J, Kumar S, Malhotra N, Deorari AK, Sharma JB. Maternal antenatal profile and immediate neonatal outcome in VLBW and ELBW babies. *Indian J Pediatr.* 2006;73:669-72.
10. Sritipsukho S, Suarod T, Sritipsukho P. Survival and outcome of very low birth weight infants born in a university hospital with level II NICU. *J Med Assoc Thai.* 2007;90(7):1323-9.
11. Arad I, Braunstein R, Bar-Oz B. Neonatal outcome of inborn and outborn extremely low birth weight infants: relevance of perinatal factors. *IMAJ.* 2008;10:457-61.
12. Hagen EW, Sadek-Badawi M, Albanese A, Palta M. A comparison of Wisconsin neonatal intensive care units with national data on outcomes and practices. *WMJ.* 2008;107(7):320-6.
13. Carneiro JA, Vieira MM, Reis TC, Boiler AP. Risk factors for the mortality of very low birth weight newborns at a Neonatal Intensive Care Unit. *Rev Paul Pediatr.* 2012;30(3):369-76.
14. Basu S, Rathore P, Bhatia BD. Predictors of mortality in very low birth weight neonates in India. *Singapore Med J.* 2008;49(7):556-60.

15. Mukhopadhyay K, Louis D, Mahajan R, Kumar P. Predictors of mortality and major morbidities in extremely low birth weight neonates. *Indian Pediatr.* 2013;50(12):1119-23.
16. Carrie K Shapiro-Mendoza. Infants born-late preterm: epidemiology, trends and morbidity risk. *Neo Review.* 2009;10:87-94.
17. Anthony S, Ouden L, Brand R, Verloove-Vanhorick P, Gravenhorst JB. Changes in perinatal care and survival in very preterm and extremely preterm infants in The Netherlands between 1983 and 1995. *Eur J Obstet Gynecol Reprod Biol.* 2004;112:170-7.
18. Kaiser JR, Tilford JM, Simpson PM, Salhab WA, Rosenfeld CR. Hospital survival of very-low-birth-weight neonates from 1977 to 2000. *J Perinatol.* 2004;24:343-50.
19. Velaphi SC, Mokhachane M, Mphahlele RM, Beckh-Arnold E, Kuwanda ML, Cooper PA. Survival of very-low-birth-weight infants according to birth weight and gestational age in a public hospital. *S Afr Med J.* 2005;95:504-9.
20. Chien LY, Whyte R, Aziz K, Thiessen P, Matthew D, Lee SK. Canadian Neonatal Network. Improved outcome of preterm infants when delivered in tertiary care centers. *Obstet Gynecol.* 2001;98(2):247-52.

Cite this article as: Shinde R, Haridas K, Nagar P, Parakh H. A study of survival of very low birth weight neonates in a tertiary care hospital. *Int J Contemp Pediatr* 2019;6:857-62.