

Comparison study of very low birth weight infants at a tertiary care hospital, dhaka: < 30 wks versus ≥ 30 wks

Abstract

Objective: Very low birth weight infants make a large contribution to neonatal mortality and morbidity. Mortality and morbidities vary according to birth weight and to gestational age. Moreover, clinical outcomes may vary between different areas as a result of specific treatment strategies in individual intensive care units. Therefore, databases about very low birth weight babies, classified on the basis of GA and BW, important for clinical decision-making. Published data on outcomes of very low birth weight infants from Bangladesh are also limited. The aim of the present study was to assess the short-term outcomes of infants with birth weights less than 1500 g treated at Square Hospital, Dhaka, over a 2 years period and the outcomes in neonates with Gestational age <30 wks were compared with infants with gestational age 30wks or more in very low birth weight group.

Patients and methods: Data of very low birth weight infants, admitted at Squire Hospitals from January 1, 2012, to December 31, 2013 were recorded prospectively. The outcomes in neonates with Gestational age <30 wks were compared with infants with gestational age 30wks or more in very low birth weight group.

Results: A total of 109 infants with birth weights of 1500 g or less were included, 62 babies were ≥ 30 wks GA and 47 babies were <30 wks GA. 23 (21%) babies were Extreme low birth weight and 86(79%) babies were within 1000gm to 1500gm. 82(75%) babies survived to discharge. Survival rates were 6% and 75% for infants weighing <1000g and 1000g to 1500g respectively. Survival rate were 28(60%) and 54(87%) in GA<30wks and ≥ 30 wks respectively. Fifty five (50.4%) babies were male and mean (SD) gestational age (GA) was 29(2.46) weeks with a range of 24 to 35 weeks. Mean (SD) birth weight was 1184 (240) g with a range of 618g to 1500 g. 87(80%) of infants were born by cesarean section. The rate of patent ductus arteriosus was 39(36%), intraventricular hemorrhage 12(11%) and clinical sepsis was 82(75%), culture proven sepsis was 13(11.9%), RDS was 48(44%), 30% were ventilated with 35 %surfactant administration rate. Mean (SD) birth weight gain days was 18(7), mean (SD) discharge weight 1486(198) and mean (SD) stay days 23(14). RDS, PDA, sepsis, death more in <30 wks in comparison to ≥ 30 wks. More babies were ventilated and got surfactant in <30 wks. Pneumothorax and pulmonary hemorrhage also more in <30wks.

Conclusion: Survival of VLBW is more and complications less in ≥ 30 weeks gestational age group.

Keywords: morbidities, databases, neonatal, gestational age, intraventricular hemorrhage, pneumothorax, patent ducts arteriosus, chronic lung disease, retinopathy of prematurity, intrapartum, intensive care unit, intraventricular hemorrhage

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Abbreviations: GA, gestational age; PDA, patent ductus arteriosus; ROP, retinopathy of prematurity; NEC, necrotizing enterocolitis; NICU, neonatal intensive care unit; IVH, intraventricular hemorrhage; NCPAP, nasal continuous positive airway pressure

Introduction

Globally 9.6% of all births were preterm. Approximately 85% of this burden was concentrated in Africa and Asia, where 10.9 million births were preterm. The highest rates occurred in Africa and North America, where 11.9% and 10.6%, respectively, of the births were preterm. Europe, where 6.2% of the births were preterm, had the lowest rate.¹ In Bangladesh, VLBW infants made up 7% of low birth weight total, but accounted for a third of infant deaths.² Prematurity is one of leading cause of neonate and infant mortality and morbidity. Preterm infants develop morbidities due to anatomical or functional immaturity. The most frequent morbidities are respiratory abnormalities, patent ductus arteriosus (PDA), intracranial hemorrhage, jaundice, necrotizing enterocolitis (NEC),

infection, chronic lung disease, and retinopathy of prematurity (ROP). The survival of preterm babies varied in different hospitals and also in different countries depending of quality of antenatal, intrapartum and neonatal care. Knowledge of the incidence of complications is important for parent counseling, as well as anticipating and planning prior to preterm birth and for quality improvement.

Clinical outcomes also vary according gestational age and birth weight. The outcome of VLBW infants is related to maturity, so GA should be a better predictor than birth weight.³ The aim of the present study was to assess the short-term outcomes of infants with birth weights less than 1500g treated at Square Hospital, Dhaka, over a 2 years period and compare the outcomes of neonates with GA<30 wks and ≥ 30 wks.

Patients and methods

This study was done from retrospectively collected data of infants with birth weights less than 1500g who were admitted to the neonatal intensive care unit (NICU) at Square Hospital, from January 2012 to

December 2013. Infants were identified during admission period and a careful review of their medical records to obtain the required data. Demographic data such as gestational age, birth weight, sex, mode of delivery, place of delivery, small for gestational age infants were recorded.

Mortality and morbidities like RDS, Intraventricular hemorrhage (IVH), Jaundice, Sepsis, PDA, ROP, BPD, NEC, Pulmonary hemorrhage, Pneumothorax during admission period were noted. The treatment for respiratory complications like nasal continuous positive airway pressure (NCPAP), conventional ventilation and surfactant administration were noted. Length of hospital stay, birth weight gain days, and discharge wt were also recorded. Neonates were also categorized into two groups according to gestational age, like <30wks & ≥30 wks. All data are compared within these two groups. Overall mortality was calculated, as well as the total number of discharged infants. Outcomes that included complications of prematurity were assessed by descriptive analysis. The differences between the two groups were calculated with two-sample t-test and chi-square test. Statistical significance was set at P< 0.05.

Results

During the study period, 109 very low birth weight babies were admitted in NICU of Square Hospital. Among them 82 babies (75%) survived and 27(24.8%) babies died. Mean gestational age was 29 wks and mean birth weight was 1184gm. 88% infants were born by C/S, 55 babies were male. 62 babies were >30 wks and 47 babies were <30 wks. PDA was diagnosed in 39(36%) infants; received oral ibuprofen. PDA more common in <30 wks. IVH was present in 12 infants(6-grade IV, 1-grade III, 5(grade I), also more common in <30 wks. 82 babies developed clinical sepsis. 13 babies had culture proven sepsis, among them 8 babies was <30 wks. Sepsis rate also more in <30 wks. Streptophomonas maltophilia were responsible for 3 cases of sepsis, streptococcus pneumonee were 2 cases, candida-3, enterobacter-2, acinatobacter-2, coagulase negative staphylococcus-1, 3 babies developed pulmonary hemorrhage and 3 babies developed pneumothorax 1 had hydrops and 3 had congenital malformations, 1 baby developed NEC with pneumoperitonium Table (1-3).

Table 1 Demographic characteristics of the study population

Parameters	≥30wks (n =62)56.9%	<30wks (n =47)43.1%	P value
Male, n (%)	30(48.4%)	25(53.2%)	0.381
Female, n (%)	32(51.6%)	22(46.8%)	
Birth weight(g)mean(SD)	1286(184)	1049(243)	0.000
SGA	14(22.5%)	1(2.1%)	0.000
Vaginal delivery n (%)	8(12.9%)	14(29.8%)	0.027
Cesarean, n (%)	54(87.1%)	33(70.2%)	
Inborn, n (%)	55(88.7%)	42(89.4%)	0.584
Survival n (%)	54(87%)	28(59.6%)	
Death, n (%)	8(12.9%)	19(40.4%)	0.001
Birth weight gain days mean(SD)	17.57(6.6)	21.4(9.6)	0.052
Discharge wt g(SD)	1459(192)	1557(205)	0.053
Stay days mean(SD)	22.55(10)	23.53(18)	0.72

Vaginal delivery more in <30 wks and SGA more in ≥30wks. Survival rate is more in ≥30wks, that was 87%, whereas 60% in <30 wks.

Table 2 Incidence of respiratory complications and related treatments

Parameters	≥30wks (n =62)56.9%	<30wks (n =47)43.1%	P value
RDS, n(%)	15(24.6%)	33(73.3%)	0.000
CPAP, n(%)	10(16.1%)	15(48.4)	0.003
Ventilation, n (%)	9(14.5%)	12(38.7)	0.055
Surfactant	10(16.1%)	28(59.6%)	0.000
Pneumothorax	0	3(6.4%)	0.000
Pulmonary hemorrhage	0	3(6.4%)	0.000

73% baby in <30 wks had RDS. More babies in <30 wks required CPAP, Ventilation and surfactant. Pulmonary hemorrhage and pneumothorax also more common in <30 wks.

Table 3 Incidence of nonrespiratory complications

Parameters	≥30wks (n =62)56.9%	<30wks (n =47)43.1%	P value
Jaundice	60(96.8%)	42(93.3%)	0.351
Sepsis, n (%)	37(59.7%)	45(95.7%)	0.001
PDA, n (%)	18(29%)	21(45.7%)	0.058
IVH, n (%)	4(6.5%)	8(17%)	0.000
Grade I	2(3.2%)	1(2.1%)	
Grade II	0	2(4.3%)	
Grade III	1(1.6%)	0	
Grade iv	1(1.6%)	5(10.6%)	
NEC	1(1.6%)	0	

Discussion

Due to advance of prenatal and neonatal care now a day's more preterm and very low birth weight babies are survived. However, Published data on outcomes of very low birth weight infants from Bangladesh are limited. VLBW morbidities and mortality vary between countries and different hospitals as a result of specific treatment pattern employed in individual intensive care units. Therefore information about VLBW on the basis of GA and BW may be important requirements for clinical decision-making. The present study was done to see the short-term morbidity for all VLBW infants who were admitted for neonatal intensive care in a tertiary care hospital in 2012 and 2013 and compare the outcomes of neonates in <30 wks GA with ≥30 wks. In our study, the C/S rate was 80% and was observed to be used more frequently in infants with a GA ≥30 wks. Jakuskiene et al.⁴ showed that delivery via C/S increased the survival rate. The association of poor survival with vaginal delivery implies that C/S might be recommended for delivery of these infants.³

In Lemons study⁵ RDS was the most frequent acute pulmonary disease in VLBW, which was 50 % and 52% were treated with surfactant therapy. In our study 48% had RDS. Surfactant therapy was used in 38 (35%) infants; Mechanical ventilation was used in 33 (30%) infants. Continuous positive airway pressure was used in 31 (28%) infants. High rates of RDS and surfactant administration were more prevalent in <30week infants, and the high rate of CPAP and mechanical ventilation also observed in <30 wks.

The American Academy of Pediatric⁶ reported the BPD rate among infants <1500 g to be 23%. Lemons study⁵ also showed BPD affected 23% of all infants. Zhang et al.⁷ reported the incidence of BPD to be 48.3% in infants with BW of ≤1500 g. In our study, the incidence of BPD was nil. Our NICU practices, such as appropriate respiratory support with a policy for safe administration of oxygen, optimal fluid and nutrition management and infection controls at proper time, might be associated with the low incidence of BPD. Another possibility is low survival rate of extreme low birth weight babies in our study, which are more prone to develop BPD. Jakuskiene et al.⁴ found the incidence of ROP requiring laser/cryocoagulation to be 9% for infants with a GA between 22 and 27 weeks and 2% for infants with a GA between 28 and 32 weeks. In our study, ROP is detected in one baby (stage 1). The low incidence in our study is due to judicious use of blood product, appropriate management of PDA, sepsis and safe administration of oxygen.

In our study, one baby was detected NEC with pneumoperitonium, which was survived after surgery. Cole et al.⁸ reported the NEC incidence in VLBW infants to be 10%. Lemons⁵ study also showed the incidence of NEC was 7%. Early minimal entreat nutrition with human milk and early detection of sepsis seems to be a factor for low incidence of NEC. GMH/IVH incidence is known to be 30% in developed countries.⁵ Jakuskiene et al.⁴ reported an IVH incidence rate of 39.1%. In our study, GMH/IVH incidence was 12(11%) which is less than the above-mentioned studies. In our study, IVH more in <30wks and PVL incidence was nil.

In our study, PDA incidence was 39(35.8%), 21 in the <30wks group and 18 in the ≥30wks group. In developed countries, PDA incidence is known to be 30%.⁹ The results of our study were consistent with those reported in the literature. In our study, the mean (SD) hospital stay was 23(14) and it is similar in both groups, because many babies were discharged earlier due to financial constraints. Late onset sepsis was 24% in Lemons study⁵. In our study 82 (75%) babies developed clinical sepsis, among them 13 (11.9%) are culture

positive. Sepsis also more common <30 wks, which is statistically significant. In our study total death was 27(24.8 %), Mortality rates in infants <30wks was higher than in infants ≥30wks. In Vermont oxford network, mortality rate was 14% in 2004.¹⁰ Velaphi et al.³ study also showed that survival rate improved with increasing gestational age. In that study overall survival rate 72% among VLBW infants. In our study survival rate was 75% which is lower than the survival rate from developed countries. So, more efforts should be needed for <30 wks babies.

Conclusion

Survival rate of VLBW infants increased with increasing GA. Sepsis, PDA, RDS, IVH more in <30wks. Pneumothorax, pulmonary hemorrhage, death also more common in infants <30wks compared with infants ≥30 wks.

Acknowledgments

None.

Conflicts of Interest

None.

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