NICU Admissions and Neonatal Outcome in High Risk Pregnancy

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ABSTRACT

Background: High Risk Pregnancy conditions cause enough morbidity for the mother but they at the same time contribute to an increase in perinatal morbidity and mortality. We studied the effect of different high risk pregnancy conditions on neonatal outcome. **Methods:** A retrospective observational study was carried out wherein the records of NICU admissions were analysed for maternal high pregnancy states. The neonatal outcome in terms of duration of NICU admission and complications were studied. **Results:** The main determinant of poor neonatal outcome was prematurity. All the maternal high risk conditions predisposing to iatrogenic or pathological prematurity had the longest duration of stay. **Conclusion:** Adequate antenatal care hereby would go a long way in improving not only the maternal outcome but also the perinatal outcome thereby contributing to attainment of long term development goals.

Keywords: NICU admissions, High Risk Pregnancy, Perinatal Outcome.

INTRODUCTION

Any pregnancy related condition that predisposes the mother or the neonate to an adverse outcome qualifies as a high risk pregnancy. Based on statistics 15-25% of pregnancies are reported as high risk pregnancies.[1] Neonatal health status at birth has a considerable effect on future development. It is well documented that preterm and late preterm babies had an increased risk ratio of both acute and long term morbidities and such complications affect the length of NICU stay compared with term infants.[2,3] Premature rupture of membranes (PROM) is another major clinical complication that is related to high rates of neonatal morbidity and mortality.[4] Some studies have also indicated increased rates of morbidity and mortality in late preterm infants of women with gestational hypertension or preeclampsia. More neonatal intensive care unit admissions, hypoglycemia, respiratory distress, and re-hospitalization were seen in these children.[5] Maternal gestational diabetes mellitus (GDM) is associated with increased perinatal morbidity. Neonatal hyperglycaemia-related events, such as hypoglycemia, respiratory distress syndrome (RDS), hyperbilirubinemia, congenital anomaly, large for gestational age (LGA), primary caesarean section, polyhydramnios, preterm delivery, admission to NICU >24 is common in mothers with GDM. NICU admission are reported in 29% of GDM and 40% in type 2 diabetes mellitus (DM) pregnancies.[6-8] Longer NICU stay was seen in pregnancies complicated by concurrent existence of hypertension and diabetes.[9]

The aim of this study was to identify the influence of pregnancy related complications on the period of neonatal length of stay in NICU. The provision of neonatal intensive care unit for complicated newborns is a great burden on the health care system. Several studies in the literature have studied the causes of neonatal hospitalization but little data is available on NICU admissions related to pregnancy complications. Such investigation would be beneficial for health organizations to access plans and proper strategies to decrease high risk pregnancies and consequently neonatal NICU hospitalization period. As a result, these strategies not only would be effective in preventing poor antenatal outcome, but also decrease the health system cost significantly.

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MATERIALS AND METHODS

This was an observational study carried out in the Department of Paediatrics at a tertiary care centre. The case records of all the neonatal admissions over a period of six months were analysed. Of 546 NICU admitted children, 54 newborns were excluded due to transfer from other centers (lack of data). The target population consisted of 492 newborns, admitted in the NICU for at least one day. Neonatal gestational age, sex, newborn's problems, the length of neonatal stay at NICU (days) were recorded in a check list. At the same time we assessed maternal obstetric medical

records and gathered data for mother's complications (PROM, preeclampsia, urinary tract infection (UTI), GDM, vaginal bleeding, addiction). Finally we evaluated statistically the effects of these complications on neonate's admission period in NICU. The software package SPSS version 19 was used to perform the statistical analysis. The t-test, Chi square, regression and ANOVAs analysis were applied where applicable. The level of significance was considered P<0.05.

RESULTS

54 of 546 neonatal medical records were excluded because of incomplete records or transfer from some other hospital. Of the remaining 492 babies were hospitalized at NICU for 1 to 54 days (mean 7.9 days), 276 were males, and 28.42% born preterm. 310 newborns weighed <2500 g at birth and 182 neonates had a birth weight between 2500 and 4000 gr. 80.5% were singletons. These are tabulated in [Table 1]. Of 489 mothers, 151 had PROM, 4.2% GDM, 1.74% UTI, 13.81% preeclampsia, 12.1% vaginal bleeding, 4.2% had gestational diabetes and 10.4% were born out of assisted reproductive techniques (ART). These data are depicted in [Table 2].

Among neonates admitted to NICU, 322 cases (65.8%) had RDS, 20 cases (1.4%) developed seizures, 5 (1%) had sepsis and 1 (0.2%) had NEC. Twenty-two percent of admitted neonates died mostly (9%) due to RDS.

Table 1: Neonatal Profile

Parameter (n=492)	Frequency
Gender	
Male	276
Female	216
Birth Weight	
<2500gms	310
2500-4000gms	182
Order of Gestation	
Singleton	395
Twins	97
APGAR Score at 1min	
<6	388
6 or more	104
APGAR Score at 5mins	
<6	375
6 or more	107
Gestational Age	
<37weeks	135
>37weeks	357

Table 2: Maternal Parameters

Maternal Complications	Frequency(%)
Multiple Gestation	98(15)
PROM	140(29.2)
Gestational diabetes mellitus	27(4.2)
Urinary tract infection	8(1.74)
Preeclampsia	65(13.8)
Drug addiction 8 (1.1)	8(0.9)
ART	50(10.4)
FGR	120(24.6)
APH	35(7.4)

Table 3: Duration of NICU Admission

Maternal Complications	Duration of Stay	p-value
PROM	10.6	<0.05
Gestational diabetes mellitus	12.1	<0.05
Urinary tract infection	5.22	>0.05
Preeclampsia	9.9	<0.05
Drug addiction	7.62	>0.05
ART	7.42	>0.05
FGR	14	<0.05
APH	7.4	>0.05

[Table 3] shows the duration of NICU admission in neonates born to mothers with high risk factors. The duration of stay was compared to the neonates admitted in NICU with no maternal complications. There was a statistically significant relation between duration of neonatal NICU stay and maternal PROM, preeclampsia, gestational diabetes mellitus and FGR. A positive correlation between neonatal complications and length of stay in NICU (P<0.001) was noticeable. The longest and shortest periods of NICU hospitalization belonged to neonates with prematurity and necrotizing enterocolitis (9.02 vs 5.10 days). Moreover, the highest mean NICU admission period were seen in premature neonates with both RDS and neonatal seizure symptoms (38 days). We also found a positive correlation between numbers of gestation and length of NICU stay. Mortality rate in newborns whose mothers' pregnancy was complicated by UTI, drug addiction, APH and pregnancies following ART were not statistically significant.

DISCUSSION

The study was conducted in a tertiary care hospital, where most of the patients were referred from other health care centers and thus belonged mostly to the high risk group. In the current study, perinatal morbidity was more obvious in high risk group than in the low risk group. Significant difference was detected in birth weight, respiratory distress, admission at NICU, endotracheal intubation and mechanical ventilation. The main determinant of poor neonatal outcome in our study was prematurity. Compared to a similar study performed on 282 patients to determine the perinatal outcome of high risk pregnancies, anemia, hypertensive disorders of pregnancy and preterm labor were the main causes in the high risk group for adverse neonatal outcome with percentages of 60.49%, 14.8% and 16% respectively.[10] Another study carried out in Pakistan aimed at reviewing the extents and determinants of perinatal mortality and included 7743 deliveries, identified antepartum hemorrhage in 20% and hypertensive disorders in 24% as the most frequent high risk factors.[11] PROM accounts for 25-40% of all preterm deliveries that increase the risk of neonatal morbidity by 75%. In addition, improvement in

survival may be associated with adverse long term sequels needing more treatment and NICU hospitalization.[12] Further analysis of the preterm cases revealed that 35 cases (59.02%) were associated with other maternal risk factor; the most frequent was pregnancy induced hypertension (25%). In severe preeclampsia, decision for termination of pregnancy no later than 34 weeks may explain this association. Even in mild preeclampsia, almost one fourth of patients (25.5%), had iatrogenic elective late-preterm deliveries.[13] The association of hypertensive disorders of pregnancy with increased incidence of preterm delivery was determined to be 46.6% in an Indian study.[14] Hypertensive disorders in pregnancy also raise the incidence of NICU admission at 35, 36, and 37 weeks of gestation and longer neonatal stay. The gestational week of delivery rather than severity of complication had greater role on NICU admission and total stay. Even IUGR neonates from preeclamptic mothers were at a higher risk of NICU stay 7 days or more than unexplained IUGR neonates.[6]

Antepartum hemorrhage (APH) was found in 7.4 % of patients of which the cause was placenta previa in 69.23% and placental abruption in 30.77%. Among this group, there was 27 fold increase in mechanical ventilation need reflecting the serious condition of the neonate as a cause of perinatal mortality.[16,17] The higher incidence of APH in our study compared to this study could be attributed to early marriage, repeated pregnancies at short intervals and advanced maternal age.[18]

Multifetal pregnancies are predisposing factors for preterm birth. Both lower gestational age and birth weight have adverse roles on morbidity following preterm birth. In developed countries, preterm birth is responsible for 75% of neonatal morbidity including neurodevelop-mental complication, pulmonary disease, and visual problem. Moreover singletons survive better in comparison with twins. The incidence of intraventricular hemorrhage (IVH) and RDS are higher in preterm twins than in singletons.[19]

We found that the highest mean length of NICU stay was seen in neonates with RDS and neonatal seizure. There was a positive correlation between neonatal mortality and RDS. Our results were consistent with other studies.

RDS is known to be the most common cause of neonatal mortality. Of infants born at 30-34 weeks, 28% had an acute lung disorder.[20] Late preterm birth (34-36 weeks) with higher risk of RDS accounts for 71.7% NICU admissions in USA.[21]

In our study the mortality rate in newborns whose mothers pregnancy was associated with GDM, APH, and pre eclampsia was higher than in others. We speculated that all these conditions could be predisposing factors for preterm births, SGA and VLBW infants resulting rise in neonatal mortality rate. Low birth weight was common in our study population. Our results were compatible with other reported studies. In an investigation carried out in Nigeria, among 87 neonatal deaths; SGA and LBW infants had greatest proportion (21.7% and 20.1% respectively).[22]

CONCLUSION

This study clearly shows that maternal health during pregnancy has a significant role to play in the neonatal outcome. Infants born to mothers with high risk actors were at a significant risk of adverse perinatal outcomes. Efforts to improve the MCH delivery services and identification and timely management o high risk pregnancies will go a long way in improvimg the neonatal outcomes.

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