Original Article

Pattern and maternal determinants of neonatal morbidity in tertiary care hospitals of Rawalpindi medical university, Pakistan

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Objective: To determine the pattern and maternal determinants of neonatal morbidity in Neonatal Intensive Care Unit (NICU) patients admitted in Tertiary Care Hospitals of Rawalpindi.

Methodology: This cross-sectional descriptive study was carried out among morbid neonates admitted in NICU of Holy Family Hospital and Benazir Bhutto Hospitals of Rawalpindi Medical University. A total of 240 alive newborn babies admitted from 25th March to 2nd April 2019 were enrolled in this study through consecutive sampling technique. We used a semi-structured questionnaire pertinent to gestational age, birth weight maternal age, mode of delivery, antenatal visits, maternal anemia, maternal obstetric history and pattern of neonatal morbidity.

Results: Study included 120 neonates with mean birth weight of 2.1kg $\pm$ 0.80. Majority (51.7%) had low birth weight and 26.7% very low birth weight. Congenital malformations were observed in 6.7% neonates. Preterm babies constituted 63.3%. We found that 48.3% mothers were 26 – 30 years of age and 76.7% were administered tetanus toxoid during pregnancy. About 20% mothers had less than 3 antenatal visits. Hemoglobin level of 40% mothers was below 9 gm/dl. About 82% preterm neonates were admitted in ICU with severe infections.

Conclusion: Preterm neonates were found to be more asphyxiated, low birth weight, infectious and jaundiced as compared to full term delivered babies. Maternal anemia should be adequately managed for outcome in neonates.

Keywords: Neonatal ICU, maternal anemia, preterm neonates, tetanus toxoid, low birth weight.

INTROUDCTION

Neonatal period is the most vulnerable period of human life as it accounts for very high morbidities and mortalities and most of these are preventable.[1] It is estimated that 130 million neonates are born each year and among these 4 million breathe their last breath in first 28 days of life.[2] Approximately 50% of all neonatal deaths occur within first 24 hours of life. Neonatal mortality statistics are the most sensitive measures of the accessibility, utilization, and usefulness of maternal and child healthcare services.[3] Pakistan has the greatest neonatal deaths because one out of every 22 neonates succumbs to death within a month of life.[4]

Morbidity among LBW and VLBW babies were reported to be higher as compared to normal birth weight babies.[5] About 99% neonatal deaths occur in low and middle income countries.[2] Poor neonatal health care outcomes in Pakistan are predominantly attributed to preterm births coupled with complications.[6] Highest share of neonatal mortality is seen in India, Pakistan and Nigeria.[2] Birth asphyxia and sepsis are leading causes of neonatal mortality in developing countries while prematurity and congenital malformation are prime causes in developed regions of the world.[7] The present study aimed to explore the pattern and maternal determinants of neonatal morbidity in NICU in Tertiary Care Hospitals of Rawalpindi.

METHODOLOGY

This cross-sectional descriptive study was carried out among morbid neonates admitted in NICU of Holy Family Hospital and Benazir Bhutto Hospital of Rawalpindi 25th March to 2nd April 2019. Alive newborn babies were enrolled through consecutive sampling technique. Data were collected regarding gestational age, birth weight, maternal age, mode of delivery, antenatal visits, maternal anemia, maternal obstetric history and pattern of neonatal morbidity by means of structured questionnaire.

Statistical Analysis: The statistical analysis was performed by using SPSS 20. chi-square test was applied. $p < 0.05$ was considered significant.

RESULTS

Study included 120 neonateswith mean birth weight of 2.1 kg $\pm$ 0.80. About 26.67% of neonates had VLBW (less than 1.5 kg) while 51.7% had LBW (less than

2.5 kg). Of the total neonates, 6.7% had congenital malformations (Spina bifida, VSD, encephalocele, meningomyelocele), 31.7% had hyperbilirubinemia and 18.3% had severe infections. Gestational age of neonates showed that 152 (63.3%) were before 37 week, 76 (31.7%) were 37 – 42 week and 12 (5%) after 42 week.

About 55% babies were delivered by Spontaneous Vaginal Delivery (SVD). Tetanus toxoid was administered to 76.7% of mothers during pregnancy. Majority (48.3%) mothers were 26 – 30 years of age. Most (26.7%) had two alive children with them. Antenatal visits were done by all mothers and 20% mothers had less than 3 antenatal visits. Of the total, 148 LBW neonates and 57% neonates were born to anemic mothers while about 83% neonates were delivered by non-anemic mothers (Table 1).

Table 1. Frequency of low birth weight neonates among anemic mothers (n = 240).

| Anemic Mothers	Low Birth Weight Neonates (< 2.5 kg)	Normal Birth Weight Neonates (≥ 2.5 kg)	Total
Yes	84	16	100
No	64	76	140
Total	148	92	240
$X^2 = 39.41$		P < 0.001	

Table 2: Relationship of maternal anemia with health outcome of neonates (n = 240).

Maternal Anemia	Health Outcome of Neonate				Total
	LBW	Asphyxia	Congenital Malformations	Severe Infections	
Yes	84	8	8	12	112
No	64	28	8	28	128
Total	148	36	16	40	240

Table 3: Birth weight of neonates in relation to preterm/full term delivery (n = 228).

Delivery Time	Low Birth Weight Neonates (< 2.5 kg)	Normal Birth Weight Neonates (≥ 2.5 kg)	Total
Preterm	112	40	152
Full term	36	40	76
Total	148	80	228
$X^2 = 15.3$		P < 0.001	

Serum hemoglobin level below 9 gm/dl in 40% mothers and 21.67% had below 11 gm/dl. Calcium and iron supplements were taken by 76.7% mothers during pregnancy and 20% gave history of antepartum hemorrhage. About 31.7% mothers had Urinary Tract Infection (UTI) during pregnancy and 26.7% mothers had toxemia of pregnancy. Health outcome of the neonates in relation to preterm or full term delivery is shown in the Fig. 1.
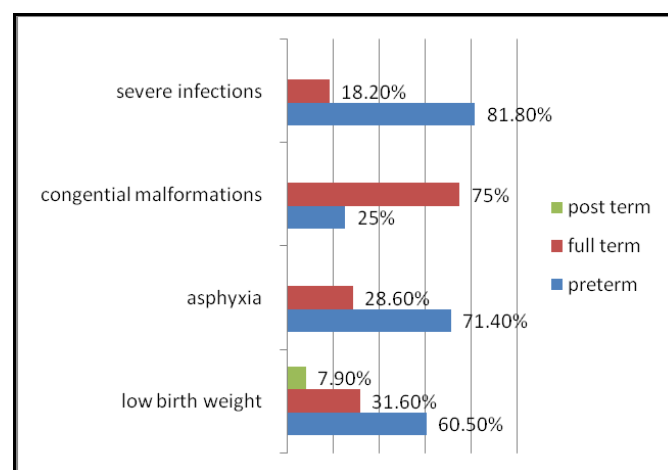
Fig. 1: Health outcome of the neonates in relation to preterm/full term/post term delivery.

We found that 8.3% mothers had gestational diabetes while 6.7% gave history of prolonged or obstructed labor. Hyperbilirubinemia was observed among 94.7% of admitted neonates. Relationship of maternal anemia with health outcome of the neonates is shown in Table 2. About 61.7% of LBW neonates were delivered and association of LBW with preterm delivery was determined to be statistically significant (p < 0.001) (Table 3). On application of chi-square test, p < 0.001 revealed statistically significant difference in birth weight of neonates delivered by anemic and non-anemic mothers.

DISCUSSION

The neonatal period is a very critical time of life being high vulnerability of neonates to serious health problems.[8]

In current study, LBW constituted the major portion of neontatal morbidities in Rawalpindi city followed by hyperbilirubinemia, severe infections, asphyxia and congenital anomalies. A similar Asian study showed different morbidity pattern among neonates with highest proportion of neonates presenting with sepsis (29%) followed by respiratory distress syndrome (23.8%), jaundice (7%) and meconium aspiration syndrome (5.5%).[9]

Another study by Shirazi et al among neonates of PIMS hospital revealed that birth asphyxia, sepsis, prematurity and low birth weight constituted the prime attributes for neonatal mortality.[10] This difference in morbidity pattern among neonates should be scrutinized in further researches. Moreover, due to small sample size the current study might not be depicting the holistic picture of the problem under study.

The present study revealed that 61.7% of neonates had LBW. Only 38.3% were found to have normal birth weight ($\geq$ 2.5 kg) as per WHO standards. Contrary to this, a retrospective study showed that 40.5% neonates were in LBW category and 6.1% with VLBW. In addition, 1.2% newborn had extremely low birth weight.[9] A prospective study by Hussain et al in neonatal unit of Combined Military Hospital Kharian concluded that preterm delivery could sufficiently be mitigated through implementation of certain interventions by our policy makers.[11]

Preterm delivery in this research could not reflect significant association with LBW. A descriptive study out among neonates of Liaquat University Hospital by Kousar et al revealed that approximately 77% of the neonates had LBW.[12] The major cause of neonatal deaths was confirmed to be preterm delivery.[12] Preterm and LBW babies are also determined to be at high risk for mortality and morbidity worldwide.[13] Despite of modernization in neonatal and perinatal care in our pediatric healthcare services, mortality and morbidity is still hitting the highest point in third world countries.[14] Similarly, an Indian study reported that 48% neonates had LBW and 28.6% were preterm babies.[15]

About 56.7% of LBW in current study is attributed to maternal anemia. In another national study, 65% babies were delivered by anemic mothers out of total 218 babies low birth weight.[10] A case control study by Anjum et al reflected the highly significant association of LBW with maternal anemia ($p < 0.001$).[16] Likewise, a systematic review by Rahmati concluded positive correlation of maternal anemia, particularly during first trimester of pregnancy, with LBW.[17]

Thus prevention of maternal anemia is imperative to reduce the frequency of LBW among our neonates. A comprehensive implementation plan on maternal, infant and young child nutrition certified by World Health Assembly during 2012 with an aim to encompass six global nutrition targets to be achieved by 2025. One of these six targets was 30% decline in LBW.[18] Our concerned strategic planners should take stringent measures to reduce the frequency of maternal anemia in order to attain Sustainable Development Goals to be achieved by 2030 in attainment of SDG 3 is essential to improve health indicators of the country.

CONCLUSION

Preterm neonates were found to be more asphyxia, low birth weight, infection and jaundice as compared to full term delivered babies. Maternal anemia and birth weight are inter-related entities that need attention of the policy makers to improve the health indicators of our future generation.

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