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Etiology of Neonatal Morbidity and Mortality in Saudi Arabia – A Mini Review

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Abstract

A new born baby is specially called a neonate in the first four weeks after birth. After a month, the baby is no longer considered a neonate. The neonates are exposed to a host of intrinsic and extrinsic conditions, which make the life vulnerable to either developing permanent deformities and morbidity or discontinuation of survival. There are many conditions including; necrotizing enterocolities, pregnancy with sickle cell anemia, antenatal prevalence of congenital anomalies, different types of congenital diaphragmatic hernia, eclampsia and pre-eclampsia, autosomal recessive disorder ((Sanjad-Sakati syndrome), Infectious diseases, hydrocephalus in neonates, bacterial sepsis in Neonatal Intensive Care Unit (NICU), caesarean sections, transferring unstable and critically ill neonates to and from the operating room to wards.

Materials and Methods: To accomplish the target on morbidity and mortality in neonates, peer-reviewed English language articles published during the last 35 years (1980 to 2015), were selected from Pub Med, Pub Med Central, Science Direct, Up-to-date, Med Line, comprehensive databases, Cochrane library, and the Internet (Google, Yahoo). Conclusion: This brief review includes explicit descriptions of the difficulties faced by the NICUs is written with a view to introduce the subject and make a broader outlook with a detailed review paper in future.

Keywords: Etiology; Morbidity; Mortality; Neonates; Saudi Arabia; Mini Review

Introduction

The neonates are exposed to a host of intrinsic and extrinsic conditions, which make the life vulnerable to either developing permanent deformities and/or morbidity or discontinuation of survival. Birth defects and genetic disorders are leading causes of infant morbidity and mortality in many countries [1]. Consanguineous marriages in Saudi Arabia are known to reason for structural birth defects outside of chromosomal and inherited disorders. The prevalence of major birth defects in Saudi Arabia is reported higher than European countries. Several patterns of neonatal and post neonatal deaths are described in Riyadh. In a study on pattern of neonatal and post-neonatal deaths among 79871 live births and 526 deaths in one of the hospitals in Riyadh [2], these authors found 84.2% inborn deaths and 15.8% out born. Of the inborn deaths, 251 died between days 1-6, 103 died between days 7-27 and 92 died after 27 days. Lethal malformations were the cause of death in 36%, prematurity and its complications in 42%, hypoxic ischemic encephalopathy in 5%, while other diagnoses, led to death in 17% of the cases. The authors concluded that prematurity and its complications followed by congenital malformations were the leading causes of death.

There is very important role of mutations in congenital birth defects. For example, congenital hydrocephalus is an important birth defect that is heterogeneous in etiology and clinical presentation. Although genetics is believed to play an important role in congenital hydrocephalus, the overwhelming majority of cases lack mutations in L1CAM, which is a disease gene identified [3]. These authors strongly support the candidacy of MPDZ as a novel congenital hydrocephalus disease gene. Briefly described are several diseases responsible for neonatal morbidities and mortalities presented hereunder:

Neonatal meningitis

In a five-year study in referral intensive care unit in Assir Central Hospital, Saudi Arabia, records of newborn infants with positive cerebrospinal fluid culture during the period 1993-1998 were retrospectively studied. There were 1473 nursery admissions, of which 32 episodes of meningitis occurred amongst 31 neonates.

Klebsiella pneumonia (31%) and Serratia marcescens (21%) were the main pathogens [4].

Hyaline Membrane disease and perinatal asphyxia in neonates

Clinical profile and immediate outcome of inborn neonates receiving intermittent positive pressure ventilation (IPPV) at NICU of Civil Hospital, Khamis Mushayt, Saudi Arabia, a level II nursery was studied. Hyaline membrane disease and perinatal asphyxia were the major indications for IPPV. 67.9% ventilated neonates survived. Gestational age of less than 28 weeks and birth weight less than 1.25 kg can be recommended as the cut off weight and gestation criteria for in utero transfer in this center and up gradation of existing facilities are urgently called for to improve the survival rates [5].

Neonatal sepsis

In a study on retrospective evaluation of serum concentration monitoring of aminoglycosides (gentamicin and amikacin) and vancomycin in neonates treated for sepsis in a maternity and children hospital in Jeddah, Saudi Arabia, over the period 1998-2000, El Desoky et al., [6] found therapeutic drug monitoring of vancomycin needs re-evaluation in the hospital to explain why existing methods are ineffective.

Vaginal breech delivery and birth trauma

In a study on comparison of pegnancy outcome in women with singleton breech presentation at term delivered by caesarean section and vaginal breech delivery in Abha maternity hospital, vaginal breech delivery was found to be strongly associated with birth trauma. It is recommended that attention should be given to trainee obstetrician in selective external cephalic version at term and surgical procedures to reduce caesarean section rate and also neonatal morbidity in term breeches [7]

Hydrocephalus in neonates

Murshid et al., [8] conducted a prospective study on Epidemiology of infantile hydrocephalus (excluding neural tube defects and brain tumors) within first 28 days of life in the city of Al-Madinah Al-Munawarah, Saudi Arabia during 1996 and 1997. The birth prevalence of infantile hydrocephalus in this study was significantly higher than in the developed countries. A positive family history of hydrocephalus, low birth weight, low Apgar score and abdominal delivery were found to be associated factors. The mortality rate in the first 6 months of life was significantly higher in hydrocephalus infants than in controls.

Early-onset group B streptococcus (EOGBS) disease in neonates

Al-Kadri et al., [9], in their study on cases <7 days of age with invasive group B streptococcus (GBS) disease studied during 2000 and 2009 (Neonatal unit at King Abdul-Aziz Medical City, Riyadh) analyzed a number of maternal risk factors to be significantly associated with EOGBS disease. Bacterial infections are an important cause of neonatal mortality and morbidity in NICUs. The major pathogens for neonatal sepsis in NICU vary with geographical area and time. It is therefore important to frequently audit neonatal sepsis in individual NICU, to aid in provision of adequate and appropriate preventive and therapeutic measures. Kilani and Basamad [10] retrospectively reviewed the medical records of all infants who had positive blood cultures during a 2-year period at a NICU in university hospital in Riyadh. The authors concluded that the overall proven bacterial sepsis related mortality among the neonates was 9%, representing 22 percent of all the neonatal deaths.

Caesarean section and neonatal mortality

In a study conducted on retrospective chart review at King Abdul-Aziz University Hospital in Jeddah during 2000 to 2010, Alnoman et al., [11] found that the neonatal morbidity was associated with six or more caesarean sections (CS). Deliveries occurred in the ranges of 31-38 weeks, from which four cases required emergency CS. There were two cases in the series with a placenta previa. There was a single case of uterine dehiscence. Only one case required a blood transfusion and was complicated with a placenta accreta, bladder injury, urinary tract infection, and prolonged maternal hospital stay with NICU admission. The long-term complications associated with CS should be discussed with patients in the first and subsequent pregnancies. This case series highlighted the outcomes in these unique cases of higher order caesareans.

Transferring unstable, ill neonates to and from the operating room

During 1999 and 2005, Mallick et al., [12] investigated the risks and morbidity involved in transferring unstable, ill neonates (at a birth weight - <1000 g) to and from the operating room in the central province on special equipment like high frequency ventilators and nitrous oxide. The authors concluded that performing major surgical procedures in the NICU is both feasible and safe. It is useful in very low birth weight, critically ill neonates who have a definite risk attached to transfer to the operating room. No special area is needed in the NICU to perform complication-free surgery but designing an operating room within the NICU would be ideal.

Necrotizing enterocolitis

Necrotizing enterocolitis (NEC) and nosocomial sepsis are associated with increased morbidity and mortality in preterm infants as is reported from one of the hospitals in Riyadh [13]. The authors concluded that enteral supplementation of probiotics was found to reduce the risk of severe NEC and mortality in the preterm infants. Necrotizing enterocolitis coupled with Hirschsprung's disease is reported to be the cause of about 20% mortality in full term infants weighing +/- 2400 g in Jeddah. One of the survivors suffered with retardation of growth and the other developed cholestatic jaundice.

Pregnancy with Sickle cell disease

Saudi women with Sickle Cell Disease (SCD) from Eastern Saudi Arabia are shown to be at a great risk of morbidity and mortality in the maternal and fetal outcome. Al Jama et al., [14] reported perinatal mortality rate of 78.2/1000 deliveries, addition to stillbirths. In addition to one maternal death out of the 145 patients, the major maternal complications in the 255 pregnancies were

anemia, sickle cell crisis (both painful and hemolytic), infections, fetal growth restriction, preterm delivery and pregnancy-induced hypertension.

Antenatal prevalence of congenital anomalies

Major congenital anomalies are foremost cause of perinatal mortality. Out of the 217 cases of fetal anomalies, Sallout et al., [15] diagnosed antenatal prevalence of congenital anomalies in 27.96 per 1000. The commonest anomalies were genitourinary and cranial. The rate of perinatal mortality was 34.9%, including all cases of intrauterine fetal and neonatal deaths reported in one of the hospitals in Riyadh.

Congenital Morgagni hernia

Congenital Morgagni hernia (CMH) comprises 3-5% of all the different types of congenital diaphragmatic hernia. Commonly, the presentation is that of recurrent chest infection. It is diagnosed during childhood, but can remain asymptomatic till adulthood. There is delay in diagnosis of CMH due to vague and nonspecific presentation in the pediatric age group the study was conducted in Dammam [16].

Eclampsia and pre-eclampsia causing perinatal mortality

In a retrospective study conducted over a period of 10 years on 32000 maternities of Abha, Sobande et al., [17] reported 18 cases of eclampsia and 297 cases of severe pre-eclampsia. Prodromal symptoms were found to significantly affect the occurrence of eclampsia, while nulliparous patients were a high-risk group of eclampsia. Although no maternal deaths were reported, the perinatal mortality rate was 16.6% and 14.1% among the eclamptics and severe pre-eclamptic patients.

Sanjad-Sakati syndrome

Sanjad-Sakati syndrome is a rare autosomal recessive disorder mainly occurring in the Arab Peninsula. This condition is associated with metabolic and septic complications starting in the neonatal period. Chronic intestinal pseudo obstruction owing to visceral myopathy is a rare disabling condition. The authors report a rare concurrence of Sanjad-Sakati syndrome and chronic intestinal pseudo obstruction in a Saudi child complicated by intestinal failure, sepsis, and early mortality [18].

Ophthalmological abnormalities

Raffa et al. [19] found that infants, born moderate-to- late preterm birth may be associated with increased ocular morbidity compared with their full-term counterparts. Auxological data at birth, especially body weight, seems to be an important factor when conducting an ophthalmological diagnosis in preschool children, and an increased Visual acuity was correlated to a higher gestational age.

Infections and Infectious diseases

Infections are the major cause of mortality and morbidity in infants under 3 months of age in developing countries [20] Most of these deaths are caused by acute respiratory infections, bacterial sepsis and/or meningitis, neonatal tetanus, and diarrhea. Of the estimated 130 million infants born each year worldwide, four million die in the first 28 days of life. Three-quarters of neonatal deaths occur in the first week, and more than one-quarter occur in the first 24 hours [21].

Hyaline membrane disease, birth asphyxia, meconium aspiration and septicemia

Neonatal mortality and causes of death at King Fahd Hospital of the University in Al Khobar, Saudi Arabia from June 1981 to May 1986 were analyzed. The overall neonatal mortality rate declined from 15.6 to 8.1/1000 lives births (LB), and after excluding lethal malformations mortality fell from 14.0 to 5.6/1000 LB. The reduction in mortality was most marked in infants weighing 1500 g or less, among whom mortality fell from 92.3 to 33% (P less than 0.001) during the 5-year period. Further, when annual variation in the very low birth weight rate was eliminated, a reduction in the mortality risk ratio from 1.47 to 0.81 was demonstrated. These significant reductions in mortality appear to be related to the establishment of neonatal intensive care. Major identified causes of death amenable to modern perinatal care were hyaline membrane disease, birth asphyxia, meconium aspiration and septicemia [22].

Conclusion

The complications of perinatal outcome are associated with genetic changes, cesarean section deliveries, chronic diseases and related pathological conditions, and weight of mother. Besides, the exposure of neonates to extreme intrinsic and extrinsic conditions results in very low birth weight neonates, whose survival is at risk due to innumerable causes and results in severe morbidity resulting in mortality. Preterm birth due to any cause carries significant risk of morbidity and mortality, especially at the earliest of viable gestational ages. Neonatal morbidity and mortality remain at worrisome levels. Improved monitoring of pregnancies and conditions of delivery, and the opening of a neonatal unit equipped with sophisticated instruments and appropriate material at the gynecological and pediatric units might help to reduce neonatal morbidity and mortality.

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