Obsterics characteristics that effect the newborn outcomes

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Abstract

Neonatal death as the death of a child during the first 28 days of life. Globally most common causes of neonatal deaths were; preterm birth, birth asphyxia, infections, birth defects, and complications related to pregnancy and/or delivery, and the poor healthcare facilities. In addition to that, neonatal morbidity and mortality risks are said to be greatly affected by gestational age, neonatal management after delivery and maternal related factors like age of mother, anemic and presence of chronic disease. In Africa countries, the major causes of neonatal mortality were reported to be birth asphyxia, birth injury, infections, and preterm birth.

Keywords: obstetrics characteristics, newborn, outcomes, mortality, morbidity

Introduction

The majority of all neonatal deaths about 75% occur during the first week of life(Obeagu et al., 2015; Obeagu, 2015; Johnkennedy et al., 2015; Obeagu, 2020; Obeagu and Katya, 2022; Obeagu, 2021; Obeagu et al., 2023), and about 1 million newborns die within the first 24 hours. Globally most common causes of neonatal deaths were reported to be; preterm birth (births <37 weeks gestation), birth asphyxia (lack of breathing at birth), infections, birth defects, and complications related to pregnancy and/or delivery, and the poor healthcare facilities(Obeagu et al., 2023; Obeagu, 2018; Swem et al.,2018; Obeagu, 2018; Obeagu et al.,2023; Nwovu et al., 2018; Obeagu et al., 2018). In addition to that, neonatal morbidity and mortality risks are greatly affected by obstetrics and maternal factories which are gestational age, maternal anemia, duration of latency, and neonatal management after delivery, placental abruption, fetal distress due to cord compression

or prolapse, and fetal deformities, all of these complications eventually lead to fetal and neonatal death *(Dars et al., 1969)*. In African countries, the major causes of neonatal mortality were reported to be birth asphyxia, birth injury, infections, and preterm birth. Birth asphyxia and birth injury occur when a newborn fails to breathe spontaneously after delivery or is in shock due to hypovolemia. Approximately 70% of neonates will be at-risk of asphyxia due to small body size (low birth weight), poorly developed lungs, and pulmonary dysfunction. Also, birth asphyxia could arise from complications from maternal during labor or at the time of delivery. Asphyxia produces hypoxemia (low oxygen) and hypercapnia (carbon dioxide retention), which could lead to death if the neonate is not provided rapid resuscitation or transferred to the NICU *(Grady et al., 2017)*.

In 2019, several studies reported that neonatal morbidities were closely associated with maternal health and characteristics related to pregnancy. Teenage mothers tend to have a high incidence of sudden infant death syndrome. This was likely related to low-birth-weight infants dying from diseases of early infancy *(Babson & Clarke, 1983)*. In contrast, pregnant women with the advanced age of 35 years or older had a significant increase to have multiple gestations, placenta previa, placental abruption, abortion, and fetal death. Furthermore, advanced maternal age was found to be related to neonatal unwanted outcome *(Schimmel et al., 2015)*.

Maternal general characteristics

Age

Maternal age is divided into 2 categories; the first category is <20 years of age; pregnancy at that age is referred to as teenage or adolescent pregnancy. WHO reported that pregnancy and childbirth complications are the world's leading cause of death among girls aged 15–19 years, with low-and middle-income countries accounting for 99 percent of global maternal deaths among women aged 15–49 years *(Neal et al., 2012)*. Along with the high maternal mortality rate

associated with adolescent pregnancy, it has a large effect on neonatal outcomes. In a 1983 study, a high incidence of sudden infant death syndrome was recorded among infants born to adolescent mothers, which led to a search for epidemiological evidence that could be linked to SIDS. It was found that, during the neonatal period, there was substantially higher overall mortality among infants born to younger mothers, which was mostly attributed to the excess of low birth-weight infants dying from early childhood diseases. Besides, it was found that in the post-neonatal era considered to be the peak time for SIDS, the incidence of SIDS was 5.2 per 1,000 in infants of adolescent mothers compared to 1.0 in infants of older mothers *(Babson&Clarke, 1983)*

Chronic hypertension and type II diabetes were more prevalent in older pregnant women. Hypertension during pregnancy can lead to an increase in the incidence of pre-eclampsia in advanced maternal age. The prevalence of both pre-gestational and gestational diabetes mellitus (GMD) is between 3 and 6 times higher. Specifically, in the general population, the prevalence of GDM is approximately 3-6%, in females over 40 years of age 7-12%, and among gravid women aged 50 years of age up to 30%. *(Attali & Yogev, 2020; Mersha et al., 2019; Yogev et al., 2010)*Not to mention pregnant women who were advanced in age were more likely to develop vascular disorders, fetal malformation, and in utero fetal death as well as increased instrumental or Caesarean deliveries (Fretts & Usher, 1995; Roman *et al.*, 2004).

Antenatal care

At least four or more antenatal care (ANC) visits are considered one of the most important interventions recommended by WHO and considered to be associated with increased maternal satisfaction and prevents unnecessary maternal deaths. Four ANC visits, iron-folic acid (IFA) supplementation, tetanus toxoid (TT) injections two or more, other diagnostic tests, and counseling, have been recommended for a long time and have been accepted by most of the countries in the world. ANC interventions are

generally thought to be effective in improving maternal and infant outcomes. Two important ANC interventions directly linked to neonatal health outcomes are IFA and TT. IFA supplementation during pregnancy can reduce preterm delivery, increase infant birth weight and prevent birth asphyxia. Not to mention that maternal TT injection provides passive protection against tetanus during the neonatal period (Borrow *et al.,* 2007*;* Cogswell *et al.,* 2018*).*

Nutritional Status

Fetal development is controlled by maternal nutritional supply to the fetus, which is greatly determined by the maternal pre-pregnancy body mass index (BMI). Both underweight and obesity are affected by newborn outcomes, which is why Height and pre-pregnancy weight are registered at the first prenatal visit and are graded as average underweight (< 18.5), normal (18.5–24.9), overweigh (25-30) and obese(30 to over)(Cedergren, 2004*)* . In a study conducted in New York, maternal underweight was described as a significant risk factor for neonatal morbidities, such as low birth weight, very low birth weight, preterm delivery, and small gestational age. In a group of Chinese women, too, underweight indicates a higher risk of growth restriction compared to normal-weight women (Ronnenberg *et al.,* 2003*).*Obesity is a problem as it contributes to the progress of severalhigh maternal weight was considerably related to gestational diabetes, preeclampsia, increased cesarean delivery, macrocosmic infant, and having an infant admitted to the NICU *(*Kumari*, 2001).*In Sweden study was reported obesity have increased risk for cesarean delivery, low Apgar score at first 5 minutes less than 7, birth weight> 4,500 g, Polyhydramnios and intrauterine growth restriction also in a study from the United Arab Emirates concerning obesity increased risk of cesarean delivery, asphyxia, and risk of neonatal intensive care unit admission of a newborn *(*Cedergren*, 2004;* Kumari*, 2001).*

Medical disorders of the pregnant women

Hypertensive disorders in pregnancy

Pregnancy-induced hypertension also known as hypertensive disorders in pregnancy, is one of the maternal diseases that causes the most detrimental effects to the maternal, fetal, and neonates. Pregnancy-induced hypertension is the general classification for hypertension diseases during pregnancy, which include pregnancy-induced hypertension (without proteinuria), pre-eclampsia (with proteinuria), and eclampsia (pre-eclampsia with convulsions) *(*Chaim *et al.,* 2008*;* Chen *et al.,* 2006*)* Maternal hypertensive disorders are more likely to cause significant adverse perinatal outcomes in low- and middle-income countries. It is estimated that 2.6 million stillbirths occur each year, and 98% occur in LMIC. Other serious neonatal outcomes from maternal hypertension include prematurity, low birth weight (LBW), intrauterine fetal demise (IUFD), intrauterine growth restriction (IUGR), respiratory distress, admission at neonatal intensive care unit (NICU), and neonatal death *(*Endeshaw & Berhan, 2015; Subki *et al.*, 2018; Uwizeyimana *et al.,* 2020*)* Preeclampsia affects approximately 4.5–11.2% of pregnancies in industrialized countries and occurs more commonly in patients at the extreme ends of the reproductive age range. It is seen more often in primigravida women than in multiparous women *(*Saadat *et al.,* 2007*)* In a study in Ethiopia, a group of hypertensive pregnant women was found to have a significant correlation of perinatal mortality with low gestational age and low birth weight, which was consistent with an increased risk of perinatal mortality among infants with an antepartum onset of HDP *(*Endeshaw&Berhan*,* 2015*)*

Gestational Diabetes Mellitus (GDM)

Gestational diabetes mellitus (GDM) is one of the most common complications during pregnancy, untreated GDM is a significant threat to maternal and neonatal health. There are several potential mediators for increased risk of GDM, maternal age and pre-pregnancy BMI are the primary ones.

Research in Germany found that the risk of GDM increased by approximately 6% with each year of age. This increase in risk is consistent with the findings published, and Pregnancy BMI was the second predominant mediator of the increased risk of GDM. Overweight and obesity, as higher BMI levels are one of the key risk factors for type 2 diabetes mellitus. It is therefore not surprising that neonates born to women with diabetes were much heavier, more often born early, and more frequently given C-section than children born to mothers without diabetes. In general, the higher preterm delivery rates were more frequently given prematurely at 32–36 weeks of gestational age, and C-sections among women with GDM can be explained by faster intrauterine growth due to overexposure to the energy source*(Domanski et al., 2018)*

Anaemia

Globally, Anemia is one of the public health concerns, which affects 32.4 million (38.2%) pregnant women around the world. Particularly, common in South East Asia (48.7%). Worldwide, it has been reported that nearly 510,000 maternal deaths occur per year associated with childbirth or early post-partum. Approximately 20% of maternal death is caused by anemia; with the majority of deaths occurred in developing countries. Anemia is the main cause of morbidity and mortality among pregnant women in developing countries with maternal and fetal consequences, which lead to premature births, low birth weight, fetal cognitive impairment, and death *(Getahun, 2017; Kalaivani, 2009; Levy et al., 2005.)*

Obstetric complications of pregnant women

Antepartum Hemorrhage

The World Health Authority describes APH as bleeding after the 28th week of pregnancy before delivery. It's mostly caused by placenta previa, placental abruption, and others. Approximately two to five percent of all pregnancy is complicated by APH, in which 22-25% of them can cause adverse maternal and neonatal outcomes(Bhide & Thilaganathan, 2004; Tyagi *et al.*, 2016)Risk factors for placental abruption include advanced maternal age, multiparity, low body mass index (BMI), abruption in a previous pregnancy, pre-eclampsia, polyhydramnios, intrauterine infection, premature rupture of membranes, abdominal trauma, smoking, drug misuse (cocaine and amphetamines), pregnancy following assisted reproductive techniques and maternal thrombophilia *(Tyagi et al., 2016)*.

Placental abnormalities are the most cause of Antepartum bleeding and they are largely associated with advanced maternal age and hypertensive disorders. Older gravidas are at increased risk for placental abruption (mostly attributed to multiparity and hypertension), placenta previa is the only placental disorder that is strongly and independently linked to increased maternal age. Nulliparous women aged >40 years have a 10-fold increased risk for placenta previa compared to nulliparous women aged 20-29 years, although the absolute risk is low (0.25% vs 0.03%, respectively) *(Yogev et al., 2010)*.

Neonatal Morbidity and Mortality

Neonatal morbidity was defined as any medical condition resulting in post-delivery inpatient hospital readmission, observational stay, or mortality in the first 28 days of life *(Shapiro-Mendoza et al., 2006)*. While Neonatal mortality is defined as neonatal death as the death of a child during the first 28 days of life, Neonatal Mortality Rate (NMR) is the number of resident newborns in a specified geographic area (country, state, county) dying at less than 28 days of age divided by the number of resident live births for the same geographic area (for a specified period, usually a calendar year) and multiplied by 1,000. The first 28 days of life persist the most crucial period in early life for an infant to stay alive; throughout this period, about 10,000 infants die each day *(Grady et al., 2017)*.

Around three million newborns die each year before reaching the age of one month, and despite recurrent "calls for action", the highest rates of newborn deaths globally have been described as

low birth weight, prematurity, infections, birth asphyxia, and trauma during delivery (Kayode *et al.,* 2014) There have been significant differences in newborn mortality throughout the world; 99 percent of neonatal deaths occur in LMICs, while 99 percent of neonatal research publications have been conducted in high-income nations until recently. This suggests a complete lack of studies and knowledge provided regarding newborn deaths in LMICs.(Mersha *et al.,* 2019; Shapiro-Mendoza *et al.,* 2006)

The WHO African Area seems to have the largest proportion of neonatal mortality and the lowest percentage decrease since 1990 in neonatal mortality. About any one of infant mortality among children under five emerged in Africa during the newborn period, and that number is increasing (Grady *et al.,* 2017). During the first 4 days of life, 4 million newborns die each year, 99 percent of these deaths occur in developing nations, where there is a shortage of appropriate health care services. With an approximate 298,000 neonatal annual mortality and a recorded mortality rate of 56 per 1000 live births, for example, Pakistan accounts for 7 percent of global newborn deaths. 87% of neonatal deaths globally are accounted for by deficiency, immaturity, and asphyxia (Manzar *et al.,* 2012).

The impact of the increasing under-five mortality rate in the world has made significant progress in developing infant deaths globally, particularly in sub-Saharan Africa. Likewise, from 36 mortality per 1,000 live births in 1990 to 19 in 2015, the worldwide neonatal death rate dropped. In absolute terms, during a similar period, the number of neonatal deaths decreased from 5.1 million to 2.7 million. Newborn deaths, moreover, showed a slower decrease around 1990 and 2015 than post-neonatal under-five mortality, i.e., 47 percent, along with 58 percent worldwide. Neonatal mortality in East Africa was substantially correlated with home births, moms without schooling, and women whose spouses agreed on preventive practices(Grady *et al.,* 2017)

Conclusion and Recommendations

Neonatal factors are main determinants of the newborn outcomes, conditions such as prematurity. In conclusion, factors that affect neonatal morbidity and mortality are beyond measure. In this study we discussed some of them. We recommend that health-care administrators increase their awareness of cost-effective methods that have been proved to work, as well as to put those ideas into action. Antenatal services such as iron and folic acid supplementation, which we believe corrects anemia throughout the pregnancy, as well as frequent ultrasound examinations and follow-ups to pregnant mothers throughout their pregnancies.

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