HTechJ Health and Technology Journal (HTechJ)

Volume 01, Number 01
February 2023
p-ISSN: 2986-5662
e-ISSN: 2985-959X

Relationship between Gestational Age and Neonatorum Asphyxia in the Neonatal Intensive Care Unit

Dwy Riska Andansari[1], Sunanto[2], Iis Hanifah[1]

[1]*Bachelor of Midwifery Study Program, Stikes Hafshawaty Zainul Hasan, Probolinggo, Indonesia*
[2]*Diploma of Midwifery Study Program, Stikes Hafshawaty Zainul Hasan, Probolinggo, Indonesia*

Correspondence should be addressed to:
Sunanto
sunanto1710@gmail.com

Abstract:
Asphyxia neonatorum is a condition where the baby does not breathe spontaneously and regularly immediately after birth; this condition can be accompanied by hypoxia, hypercapnia, and up to acidosis. This study aims to analyze the relationship between gestational age and the incidence of neonatal asphyxia in the Neonatal Intensive Care Unit at Tongas Hospital, Probolinggo District. This research is quantitative with a correlational design using a cross-sectional study approach with a total of 35 respondents using an accidental sampling technique. Data collection includes coding, editing, and tabulating, then analyzed manually and by computer with the Spearman Rank Test. Based on data from 35 respondents who were studied in the period June 20, 2022, to August 31, 2022, the majority were preterm, with a total of 17 respondents (48.6%), including mild asphyxia 4 (11.4%) and moderate asphyxia 13 respondents (37.1%) %). With p=0.000 (a=0.05), there is a relationship between gestational age and the incidence of neonatal asphyxia in the Neonatal Intensive Care Unit at Tongas Hospital, Probolinggo Regency. Midwives are expected to immediately determine gestational age because it is important to predict delivery to prevent neonatal asphyxia.

Article info:
Submitted:
08-01-2023
Revised:
01-02-2023
Accepted:
02-02-2023

Keywords:
nutritious food; toddlers; stunting; quail eggs

DOI: https://doi.org/10.53713/htechj.v1i1.12

INTRODUCTION

Neonates, infants, and toddlers are a period that will determine the growth and development of childhood, adolescence to adulthood. Given this, proper and procedural handling is necessary to ensure the safety and health of the masses (Sudarti & Khoirunnisa, 2016). The ratio of the high and low maternal mortality rates and infant mortality rates determines a country's health services. The infant mortality rate reflects more on a country's ability to provide health services (Manuaba, 2010). So, the mechanism for improving infant nutrition is closely related to improving the mother's quality of life, similar to the results of research by Afandi et al. (2021) regarding improving the quality of life can be obtained through nutrition and reducing stress level (Pamela et al., 2022).

Asphyxia is a condition in which newborns experience spontaneous and regular respiratory failure immediately after birth. Asphyxia is a cause of death in newborns. Every year there are 120 million babies born in the world, and 1 million babies die due to asphyxia (Marwiyah, 2016). According to the world health organization (World Health Organization (WHO), 2016), every year there are 120 million babies born worldwide. Globally there are 4 million babies (33%) who are stillborn at the age of 0 to 7 days (perinatal), and there are 4 million babies (33%) who are stillborn at the age of 0 to 28 days (neonatal). Of the 120 million babies born, there were 3.6 million babies

Volume 01, Number 01
February 2023
p-ISSN: 2986-5662
e-ISSN: 2985-959X

(3%) who experienced asphyxia, and nearly 1 million asphyxia babies (27.78%) died. The infant mortality rate (IMR) is the number of deaths of infants under one year in every 1000 live births.

The infant mortality rate in Indonesia in 2016 was 32 per 1000 live births. This means that 32 babies die in every 1000 live births. The achievement of IMR in 2017 did not match the target of the Ministry of Health's strategic plan, namely, 24 per 1000 live births in 2017. As many as 47% of all infant deaths in Indonesia occurred in the neonatal period (under one month of age). Every 5 minutes, one newborn dies. The causes of neonatal death in Indonesia are LBW (29%), asphyxia (27%), birth trauma, neonatal tetanus, other infections, and congenital abnormalities (National Population and Family Planning Board et al., 2018).

Every pregnant woman expects a healthy and comfortable pregnancy without any complications because every pregnant woman is at risk of death for the mother and her baby (Novelia et al., 2022). The health of pregnant women is an important aspect to pay attention to in a woman's life cycle because, during her pregnancy, she can experience unwanted complications (Pusparini et al., 2021). Pregnancy is a natural process for a woman, but during prenatal visits, she may complain that she will experience discomfort (Hamidah et al., 2022). Pregnancy causes hormonal changes in women due to increased estrogen, progesterone, and the release of the placental chorionic gonadotropin (HCG) hormone (Azizah et al., 2022).

Pregnant women already know information about a risky pregnancy and consider themselves not at risk (Rifiana & Sari, 2021). Antenatal Care has a real positive impact on reducing maternal and infant mortality because pregnant women can find out the growth of the fetus and its health. (Novelia et al., 2021). Anemia during pregnancy is one of the main causes of maternal and infant mortality because it can cause developmental disorders and barriers to the fetus and body and brain cells, birth defects, miscarriage, low birth weight (LBW), fetal death in the womb, and anemia in infants. (Laiskodat et al, 2021). This service mechanism for patients can be carried out after health workers, such as nurses, carry out handovers and evaluations in addition to clients and families (Rifai et al., 2020).

A pregnant women's nutritional status greatly affects the fetus's health and development. Impaired uterine growth can cause low birth weight (Novelia et al., 2021). Anemia in pregnant women will interfere with the growth of the fetus so that they are born with LBW and short (stunting). Anemia will also cause decreased immunity and perinatal death (Kurniyawan, 2023). The baby's alveoli are filled with fetal lung fluid when the baby is born. The fetal lung fluid must be cleaned first if air must enter the newborn's lungs. Under these conditions, the lungs require a large enough pressure to expel the fluid so the alveoli can expand for the first time. To inflate the lungs, the first breath attempt requires a pressure 2 to 3 times higher than the pressure for subsequent breaths to succeed. At the time of birth, blood circulation in the lungs must increase to allow for adequate oxygenation. This situation will be achieved by opening the arterioles and filled with blood that previously flowed from the lungs through the ductus arteriosus. Babies with asphyxia, hypoxia and acidosis will maintain fetal circulation patterns by decreasing pulmonary blood circulation (Prawirohardjo, 2017).

Treatment in the intensive care unit is more complex and dynamic due to the instability of the patient's condition and requires more attention from nurses. The nurse assists the patient's needs through therapeutic interventions (Fitriyah et al., 2022). Nurses save lives and help patients meet their needs (Rastiti et al., 2022). Nurses in intensive care Units (ICU) have completed nursing studies at the diploma level and have more than ten years of experience as a nurse (Rohmawati et al., 2021). This study aims to analyze the relationship between gestational age and the incidence of neonatal asphyxia in the Neonatal Intensive Care Unit at Tongas Hospital, Probolinggo District.

METHOD

A quantitative research design with a correlational design using a cross-sectional study approach. In a cross-sectional study, the subject was observed only once through measurements or observations simultaneously with the aim of seeing the independent and related variables. The independent variable in this study is gestational age, and the dependent variable is the incidence of neonatal asphyxia (Notoatmodjo, 2016). This research was conducted in the Neonatal Intensive Care Unit Room of the Tongas Hospital, Probolinggo Regency, with the research title, the Relationship of Pregnancy Age with the Incidence of Asphyxia Neonatorum in the Neonatal Intensive Care Unit Room of the Tongas Hospital, Probolinggo Regency.

The Tongas Regional General Hospital was built from 2000 until the end of 2001 and was put into operation on March 21, 2002. Standing on the land of the former agricultural extension office of the Tongas District and land belonging to the Probolinggo District Government. Initially, the Tongas Hospital was taken from the Tongas Health Center and gradually with additional staff, the Tongas Regional General Hospital stood alone through Probolinggo Regent Decree No. 141 of 2002.

RESULT

Table 1. Respondents' Characteristics based on Age, Education, Occupation, Parity, Maternal Age of Pregnancy, and Incidents of Asphyxia Neonatorum (n=35)

Variables	Frequency	Percentage
Age		
< 20 years	16	45.7
21-35 years	14	40.0
> 36 years	5	14.3
Educational background		
Elementary School	16	45.7
Junior High School	12	34.3
Senior High School	5	14.3
University	2	5.0
Occupation		
Housewife	23	65.7
Farmer	7	20.0
Entrepeneur	5	14.3
Mother Parity		
Primipara	17	48.6
Multipara	17	48.6
Grandmultipara	1	2.9
Gestational Age		
Aterm (Enough Months)	10	28.6
Preterm (Less Months)	17	48.6
Postterm (postdate)	8	22.9
Asphyxia Incidents		
No Asphyxia	7	20.0
Mild Asphyxia	8	22.9
Moderate Asphyxia	17	48.6
Severe Asphyxia	3	8.6

Volume 01, Number 01
February 2023
p-ISSN: 2986-5662
e-ISSN: 2985-959X

Based on table 1, the largest percentage of respondents are mostly aged <20 years (45.7%), the largest percentage of respondents are in elementary education (45.7%), the largest percentage of respondents were housewives (65.7%), the largest percentage of respondents were primiparas and multiparas (48.6%), most of the gestational-age women giving birth at Tongas Hospital at preterm (48.6%), and the majority of those who experience moderate asphyxia (48.6%).

DISCUSSION

The Age of Maternity Pregnancy

Most of the gestational-age women giving birth at the Tongas Premature Hospital 17 respondents (48.6%). The largest percentage of respondents are mostly aged <20 years. The largest percentage of respondents are Primiparas and Multiparas, with a total of 17 respondents (48.6%). Preterm delivery is labor that occurs at a gestational age of fewer than 37 weeks (20-<37 weeks) or with a fetus weighing less than 2500 grams (Syarif et al., 2017). During childbirth with premature babies, their vital organs are not yet fully developed, causing them to be unable to live outside the womb, so they often experience failure where the lungs are immature, preventing the baby from breathing freely (Gerungan et al., 2014). According to the researchers' assumption that babies born to mothers with a gestational age exceeding 42 weeks can cause neonatal asphyxia. This is because the function of the placenta is no longer optimal due to the aging process resulting in impaired oxygen transportation from mother to fetus. Placental function reaches its peak at 38 weeks of gestation and then begins to decline, especially after 42 weeks. This can be evidenced by decreased levels of estriol and placental lactogen.

Identifying the Incidence of Asphyxia Neonatorum

The majority of those who experienced moderate asphyxia were 17 respondents (48.6%). Neonatal asphyxia is when the baby does not breathe spontaneously and regularly immediately after birth. This condition can be accompanied by hypoxia, hypercapnia, and acidosis (Hidayat, 2018). Neonatal asphyxia is a condition that occurs when a baby does not get enough oxygen during the birth process (Mendri & Sarwo, 2017). Neonatal asphyxia is a condition in which a baby cannot breathe spontaneously and regularly, so it can reduce O2 and increase CO2, which can have adverse consequences in further life (Jumiarni et al., 2016). According to the researchers' assumption that the incidence of asphyxia is due to maternal factors, including hypoxia in the mother that occurs due to hypoventilation due to administration of analgesic or anesthetic drugs, maternal age less than 20 years or more than 35 years, gravida four or more, low socioeconomic status, and maternal vascular disease which interfere with the fetal gas exchange such as high cholesterol, hypertension, hypotension, heart, lungs/tuberculosis, kidneys, uterine contraction disorders, and others. Placental factors include placental abruption, placental bleeding, small placenta, thin placenta, and placenta not attached to its place. Fetal or neonatal factors include protruding umbilical cord wrapped around the neck, compression of the umbilical cord between the fetus and the birth canal, Gimli, IUGR, premature, congenital abnormalities in neonates, and others.

Analyzing the Relationship between Gestational Age and Asphyxia Neonatorum

Most of them had preterm or preterm pregnancies, 17 respondents (48.6%) included those who experienced mild asphyxia, four respondents (11.4%), who experienced moderate asphyxia several 13 respondents (37.1%). The arteriolar blood vessels in the baby's lungs are still in a state of constriction, and almost all of the blood from the right heart cannot pass through the lungs, so

Volume 01, Number 01
February 2023
p-ISSN: 2986-5662
e-ISSN: 2985-959X

the blood flows through the ductus arteriosus and then enters the aorta, but the oxygen supply through the placenta is cut off when the baby enters extrauterine life (Masruroh, 2016). The loss of oxygen supply through the placenta during the extrauterine period causes the neonatal lung function to be activated, and changes occur in the alveoli, which are initially filled with fluid and then replaced by oxygen (Behrman et al., 2016). The process of fluid replacement occurs due to chest (thoracic) compression of the baby during the second stage of labor, where when the head is expelled, it causes the body, especially the chest (thorax), to be in the birth canal so that compression occurs and the fluid contained in the lungs is expelled (Manuaba, 2010).

According to the researcher's assumption, if there is a disturbance in this transition process, where the baby fails to make his first breath, the arterioles will remain in vasoconstriction, and the alveoli will remain filled with fluid. The condition in which newborns fail to breathe spontaneously and regularly immediately after birth is called asphyxia neonatorum (Fida & Maya, 2012). According to Price & Wilson (2006), respiratory failure occurs when the lungs cannot fulfill their primary function in gas exchange, namely arterial blood oxygenation and carbon dioxide removal 17 respondents (48.6%). In this study, it was found that there is a relationship between gestational age and the incidence of neonatal asphyxia in the Neonatal Intensive Care Unit Unit at Tongas Hospital, Probolinggo Regency, in 2022. Midwives are expected to immediately determine the gestational age because it is very important to predict delivery to prevent neonatal asphyxia.

CONCLUSION

Based on data, the majority were preterm (48.6%), including mild asphyxia (11.4%) and moderate asphyxia (37.1%) %). With p=0.000 (a=0.05), there is a relationship between gestational age and the incidence of neonatal asphyxia in the Neonatal Intensive Care Unit at Tongas Hospital, Probolinggo Regency. Midwives are expected to immediately determine gestational age because it is important to predict delivery to prevent neonatal asphyxia.

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