

# The relationship between maternal anemia of a term pregnancy and neonatal asphyxia in Banda Aceh

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**Abstract.** Maternal anemia is a common problem in pregnancy which causes maternal and fetal oxygen transport disrupted. The disorder may lead to hypoxia of the fetus inside the womb resulting in neonatal asphyxia which is the main cause of neonatal mortality on a term pregnancy. The study aimed to investigate the relationship between maternal anemia in a term pregnancy with occurrence of neonatal asphyxia Banda Aceh. This is an analytic study using cross sectional design. The study population was all a term pregnant women who gave birth in Zainoel Abidin Hospital and Mother & Child Hospital, Banda Aceh. Data were collected from medical records of mothers and babies delivered from January to February 2012. Samples were taken by purposive sampling with 91 samples. Maternal (gravidae) anemia is defined as the condition in which level of Haemoglobin (Hb) < 11gr/dl and neonatal asphyxia defined as Apgar score < 7 at the first or the fifth minutes. The data analyzed using chi square test ( $\alpha=0.05$ ). The results showed that mother who had anemia and having baby with neonatal asphyxia was 10 (20.8%). It also showed that mothers who suffered from maternal anemia are 4.47 times more likely to have baby with neonatal asphyxia ( $p$  value= 0,023). In conclusion, pregnant women with anemia have a higher risk to deliver baby with neonatal asphyxia than those of not anemia.

**Key words:** maternal anemia, a term pregnancy, neonatal asphyxia.

## Introduction

Nutritional status of mothers before and during pregnancy affects significantly on fetus growth. One of methods used to determine the nutritional status of pregnant women is by using level of hemoglobin (Hb). Anemia in pregnancy is a potential harm for maternal and children morbidity and mortality (Aminullah, 2006). In pregnant women, anemia is more likely to increase the frequency of complications in pregnancy and childbirth, maternal mortality, prematurity, Low Birth Weight (LBW), and perinatal mortality (Kosim, 2008). Impacts of anemia in pregnancy are varied from very mild to severe complications including disorders of the fetus (abortion, low birth weight, neonatal asphyxia) (Martaadisoebrita, 2005).

Lone et al. (2004) found that regardless gestation and type of delivery, showed that pregnant women who suffered from anemia are 1.8 times higher to have baby with asphyxia than in women without anemia. Bakhtiar et al. (2007) and Taseer et al. (2011) in their study also mentions that pregnant women with anemia give birth to babies who have APGAR scores were significantly different from babies born to mothers who are not anemic. Maternal hemoglobin levels significantly affect the state of the baby to be born. Pregnant women who are anemic due to low levels of their hemoglobin not only endanger their lives but also interfere the growth and development of the fetus as well as life-threatening. It may be caused by a lack of supply of nutrients and oxygen (O<sub>2</sub>) in the placenta that will affect the placenta function of fetus (Manuaba, 2008). Maternal hemoglobin levels may affect fetal anoxia or hypoxia and ends with neonatal asphyxia (Aminullah, 2006). Thus the

aim of this study was to find out the relationship between maternal anemia and neonatal asphyxia.

### **Materials and Methods**

A cross sectional study was conducted on pregnant women admitted and delivered in labour room in Zainoel Abidin Hospital (RSUDZA) and Mother and Child Hospital (RSIA) from September 2011 - February 2012 who are in a term pregnancy (37-40 weeks), deliver in spontaneous labor and having at least one antenatal haemoglobin estimation were included in the study. Total of 91 patients were included in this trial. Women with history of hypertension, pre-eclampsia or eclampsia, diabetic, fetal distress, prolonged/ obstruct labor 1) multiple pregnancy, Premature Rupture Of The Membrane (PROM), babies born with major congenital abnormalities, umbilical cord prolapse, placenta abruptio and meconium were excluded from the study. Asphyxia status is measured from the Apgar score. The data was analysed by using "χ<sup>2</sup>" test to determine the level of significance ( $\alpha = 0.05$ ). Results are expressed as percentage for better co relation.

### **Results and Discussion**

During the study period, 189 patients were recorded who have spontaneous labor, 91 of which are set as samples while the rest were excluded because they did not meet the inclusion criteria of the study. Data of cross tabulation between maternal anemia and neonatal asphyxia is listed in Table 1.

Table 1. Cross tabulation of maternal anemia and neonatal asphyxia

| Maternal Anemia | neonatal asphyxia |            | Total     | p-value | PR    | CI 95%       |
|-----------------|-------------------|------------|-----------|---------|-------|--------------|
|                 | Yes               | No         |           |         |       |              |
| Yes             | 10 (20.8%)        | 38 (79.2%) | 48 (100%) | 0,023   | 4,479 | 1,039 -9,313 |
| No              | 2 (4.7%)          | 41 (95.3%) | 43 (100%) |         |       |              |
|                 | 12                | 79         | 91        |         |       |              |

PR = Prevalence Ratio

Table 1 shows that pregnant women who suffered from anemia is 48 patients (52.7%). The result is consistent with study of Novita et al. (2005) who found that the prevalence of anemia during pregnancy varies, according to the average prevalence of anemia among pregnant women from 33% to 75%, and 55.2% worldwide (WHO, 2005). Maternal anemia is still a major problem in pregnant women around the world, especially in developing countries (WHO, 2005).

Anemia in pregnancy can lead to a variety of adverse effects, such as neonatal asphyxia and death for both mother and fetus. Molteno et al. (1974) in his study showed that pregnant women with anemia had a prevalence of 6.3 % for infants with asphyxia. Research by Majeed (2007) of 125 infants born with asphyxia, 75 (60 %) of them from mothers who suffered from anemia during pregnancy. WHO (2005) reported that 20% of deaths occur in pregnant women caused by anemia. Korejo et al. (2007) maternal anemia caused 0.4% of deaths in fetus.

Nevertheless, the effects of anemia vary depending on the degree and type of anemia that affects pregnant women. Based on the research by Lee et al. (2008) found that different effects may occur on fetus caused by iron deficiency anemia and hemo dilution or plasma volume expansion that may not cause adverse effects on birth outcomes. There are several factors that may cause high prevalence of maternal anemia such as nutrition during pregnancy, particularly iron which greatly affect the maternal hemoglobin. Approximately

83% of pregnant women in developing countries do not get sufficient iron supplement intake, in addition to the increase in parity and gravid also affect the state of maternal anemia, because it affect the body iron stores ( Taseer et al., 2011).

Tabel 2 below showed the proportion of neonatal asphyxia in the study. It shows hat babies born with a mild state of asphyxia - were as many as 10 infants (83.3 %). The results are similar to study by Lone et al. (2004), Bakhtiar et al. (2007), who found that babies born with neonatal asphyxia less than babies born with non neonatal asphyxia in a population. Nevertheless, neonatal asphyxia is a serious problem in the world. Each year, approximately 4 million babies are born with neonatal asphyxia, which causes 1 million deaths and more than half causing permanent neurological abnormalities, such as cerebral palsy, mental retardation, and epilepsy (Cunningham et al., 2006).

Table 2 Proportion of neonatal asphyxia

| Classification of neonatal asphyxia | Frequency (n) | Percentage (%) |
|-------------------------------------|---------------|----------------|
| Mild – moderate asphyxia            | 10            | 83,3           |
| Severe asphyxia                     | 2             | 16,7           |
| Total                               | 12            | 100            |

Afzal et al. (2011) showed that asphyxia is a leading cause of death in the first 28 days of babies' life in the world. Approximately 23-25% in India, 30% in Nepal, 14% in South Africa and around 30-56 % in Indonesia (Lee et al., 2008). Study by Lone et al. (2004) found that anemia may have a direct effect in increasing synthesis of corticotrophin hormone that causes tissue hypoxia. The study also shows that pregnant women who suffered from anemia and having baby with neonatal asphyxia is 20.8 %, was higher than those who do not suffered from anemia with p-value 0,023 ( $p < 0,05$ ). Thus, there is a significant relationship between maternal anemia and neonatal asphyxia in Banda Aceh. From the analysis, it is also found that the Prevalence Ratio is (PR) 4.479 (95% CI = 1.039 to 19.313). It means that mothers who suffered from maternal anemia are 4.47 times more likely to have baby with neonatal asphyxia than non maternal anemia.

The results are similar to study by Lee et al. (2008), maternal anemia is a risk factor in ante partum to cause neonatal asphyxia. Study Lone et al. (2004) and Bakhtiar et al. (2007) found that mothers who suffered from anemia had chances 1.8 and 1.7 times more likely to give birth to babies with lower APGAR scores (95 % CI: 1.2-3.7). Hemoglobin levels of pregnant women have an influence on the condition of oxygen deficiency because hemoglobin is a substance that carries oxygen to mother and fetus. So, in case of interruption of oxygen transport to fetus may cause intrauterine hypoxia which can lead to reduction in blood flow to some organs and cause neonatal asphyxia (Prawirohardjo, 2008).

### **Conclusions**

Present data showed that mothers who suffered from maternal anemia are 4.47 times more likely to have baby with neonatal asphyxia ( $p$  value= 0,023). In conclusion, pregnant women with anemia have a higher risk to deliver baby with neonatal asphyxia than those of not anemia.

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