ANAEMIA IN PREGNANCY: A RETROSPECTIVE STUDY
IN MATERNAL CHILD AND HEALTH CLINIC SRI AMAN, SARAWAK

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<th>Meaning</th>
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<tr>
<td>&lt;</td>
<td>Lesser than</td>
</tr>
<tr>
<td>≤</td>
<td>Lesser than or equal to</td>
</tr>
<tr>
<td>&gt;</td>
<td>More than</td>
</tr>
<tr>
<td>≥</td>
<td>More than or equal to</td>
</tr>
<tr>
<td>$X^2$</td>
<td>Chi square</td>
</tr>
<tr>
<td>g/dl</td>
<td>Gram per decilitre</td>
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</table>
LIST OF ABBREVIATIONS

1. Hb  Haemoglobin
2. MCHC  Maternal and Child Health Clinic
3. IDA  Iron deficiency anaemia
4. LBW  Low birth weight
5. TM  Trimester
6. SGA  Small for gestational age
7. IUGR  Intrauterine growth restriction
8. APGAR  Appearance, pulse, grimace, activity and respiration
9. OCP  Oral contraceptive pill
10. Depo  Depovera
11. WHO  World Health Organization
12. CDC  Center for Disease Control
13. UN  United Nation
14. UNICEF  United Nations Children's Fund
15. JKNS  Jabatan Kesihatan Negeri Sarawak
ABSTRACT

This is a retrospective study on anaemia in pregnancy of 250 respondents who went for antenatal follow up in MCHC Sri Aman and delivered in 2010. Sri Aman, a rural area which recorded high prevalence of anaemia compared to other divisions in Sarawak. The purpose of this study are to study the prevalence of anaemia and its relation to sociodemographic characteristics, obstetric profile and birth outcome. Antenatal index cards were used to calculate the prevalence using WHO criteria of anaemia (Hb<11g/dl). Data obtained were compared according to categories whereby anaemia status was the dependent variable. The results showed those less than 20 years old, minority ethnicity, educated at primary or lower level, skilled workers and not married had the highest prevalence of anaemia. Further analysis showed that, age, level of education, occupation and marital status do not have significant association with anaemia. In term of obstetric profile, higher prevalence of anaemia was observed in respondents with positive history of abortion, anaemia for past pregnancy and no history of Caesar. Users of oral contraceptive pills seem to have lower anaemia prevalence. Its significance was unable to be calculated as data was too small. Longer spacing, grandmultigravida and primiparity had the highest prevalence of anaemia but were found insignificant. Mean birth weight of newborns of these respondents was 3.0 kg (±0.41). Low birth weight constitutes 9.2% of study. Highest anaemia prevalence was among mothers of macrosomic babies but sample size was too small to be analysed. Fisher exact test analysis showed no significant association of birth
weight of babies and anaemia status of mothers. It is recommended for future study, findings in this study can be more meaningful if bigger sample size could be obtained.
ABSTRAK

dianalisa. Ujian Fischer menunjukkan (p > 0.005) tiada kaitan signifikan antara berat badan bayi dan kejadian anaemia. Pada masa hadapan, adalah dicadangkan saiz sampel yang lebih besar dilakukan untuk kajian ini.
1.1 Introduction

Anaemia is the most prevalent nutritional deficiency during pregnancy (Haniff et al, 2007a). Anaemia is defined as a reduction in the oxygen-carrying capacity of the blood as a result of fewer circulating erythrocytes than is normal, or a decrease in the concentration of haemoglobin (Hb) (Ganong, 2003). Anaemia is a public health problem that affects populations in both rich and poor countries with major consequences for human health as well as social and economic development. A risk of both maternal and perinatal mortality, anaemia in pregnancy is considered by World Health Organization as part of maternal health indicator. This in turn makes adverse birth outcomes particularly low birth weight resultant of anaemia another top public health concern. Affecting all stage of life and status, majority of anaemia is due to iron deficiency. In 2002, iron deficiency anaemia (IDA) was considered to be among the most important contributing factors to the global burden of disease (WHO, 2002).
Anaemia is ignored in most developing countries even though it is in the “top ten” risk factors contributing to the global burden of disease (WHO, 2010) and is the second most common cause of disability in the world (Murray & Lopez, 1997). Even mild anaemia negatively affects health, productivity, development, and immune function, and it is particularly detrimental to children, pregnant women, and individuals with HIV infection (Gilgen, Mascie-Taylor, & Rosetta, 2001). Iron deficiency causes at least 50% of all anaemia, and almost a million deaths a year; three-quarters of the deaths occur in Africa and South-East Asia (Stoltzfus, et al. 2011a). One study estimates the economic costs of IDA at 4.05% of gross domestic product (GDP)—US$2.32 per capita in lost productivity and US$14.46 per capita in lost cognitive function (IDA reduces IQ by half a standard deviation). Worldwide, $50 billion in GDP is lost annually (World Bank, 2011).

According to WHO Global Database on Anaemia (2005), the global prevalence of anaemia for the general population is 24.8% and it is estimated that 1620 million people are affected by anaemia. There are almost no countries where anaemia is not at least a mild public health problem in three most vulnerable groups for which country-level estimates i.e. preschool children, pregnant and non-pregnant women. For pregnant women, over 80% of the countries have a moderate or severe public health problem particularly Sub Saharan African and South Asian countries. The level of the public health problem in pregnant women across countries is illustrated in Figure 1.1.
For pregnant women the prevalence of anaemia, distribution by region is as followed. According to the figure above, the highest prevalence is in Africa (57.1%) and in South-East Asia (48.2%), followed by the Eastern Mediterranean (44.2%), Western Pacific (30.7%), and the European Americas regions, 25% and 24.1% respectively (WHO, 2010). Nearly half the pregnant women in the world are estimated to be anaemic, i.e. 52% compared to 23% in industrialized countries. The figure shows that anaemia is a public health problem in both developing countries and developed world. Overall, 56.4 million pregnant women are anaemic (41.8% prevalence globally) (WHO, 2010).
To explain the significance of mentioned figures, in Table 1.1, a WHO proposal of a classification of anaemia’s public health significance in populations based on the prevalence estimated from haemoglobin levels is as followed:

Table 1.1: Prevalence of anaemia and its public health significance.

<table>
<thead>
<tr>
<th>Category of public health significance</th>
<th>Prevalence of anaemia</th>
</tr>
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<tbody>
<tr>
<td>Severe</td>
<td>&gt; or = 40%</td>
</tr>
<tr>
<td>Moderate</td>
<td>20% to 39%</td>
</tr>
<tr>
<td>Mild</td>
<td>5.0% to 19.9%</td>
</tr>
<tr>
<td>Normal</td>
<td>&lt; 5.0%</td>
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Adapted from “Number of countries categorized by public health significance of anaemia” WHO, 2010.

In Malaysia, Tee and colleagues (1984a) found 30%-60% maternal anaemia occurring at urban setting. A study in rural Kelantan by Zulkifli (1997a), found 47.5% moderate anaemia (Hb<11 g/dl), 1.9% had severe anaemia (Hb<9.0 g/dl) in antenatal care. Haniff and colleagues (2007b) found 35% of pregnant women in Malaysia suffered from anaemia in the cross sectional national study. From Table 1.1, it can be concluded, that Malaysia national anaemia figures of 35% in 2007 though gradually decreasing over the last decade, is categorized as of moderate public health concern.
1.2 Statement of Problem

According to Sarawak Maternal and Child Health Annual Report (2009), out of 31,961 new antenatal cases, 14.23% and 1.13% suffered from mild and severe anaemia respectively. In major cities such as Kuching, Sibu and Miri, figure shows 25-39% of its antenatal cases suffering from anaemia. Though iron deficient anaemia has much improved since the last decade, fluctuating trend of mild anaemia and stagnant case of severe anaemia has been of much concern (Figure 1.1). Rural area of Mukah, Matu, Daro, Oya-Dalat, Lawas, Betong, Asajaya, Bintulu and Tatau shows high anaemia prevalence in 2008 (>20%) (JKNS, 2010).

![Figure 1.2: Percentage of anaemia in pregnancy in Sarawak (1998-2008) Adapted from Maternal and Child Health Annual Report (Jabatan Kesihatan Negeri Sarawak, 2009).](image)

In spite of massive efforts and investments through iron cum folic acid supplementation and diet counselling offered by antenatal clinics anaemia in pregnancy in the latest decade, good
outcomes has not happened as desired in Malaysia, particularly iron deficiency anaemia (IDA) (Haniff et al., 2007c). In addition, these programs have targeted only pregnant women and have not paid sufficient attention to the iron status, including iron reserves, of non-pregnant women of childbearing age despite high risk of iron deficiency and iron deficiency anaemia (Tee et al., 1998a). There is much to explore in terms of demographic and obstetric history that can predispose these pregnant women to anaemia. Anaemia in pregnancy is an on-going problem that need as much study as possible particularly for local use. By identifying demographic characteristics and obstetric property of the women who are affected by this problem, this information can facilitate risk identification and treatment.

Background

For this study, MCHC Sri Aman, Sarawak, was chosen because it has one of the highest prevalence of anaemia in pregnancy which was 31.33% (JKNS, 2009).

Figure 1.3: Map of Sarawak division and its area
Sri Aman, formerly known as Simanggang which means ‘town of peace’, has about 86,030 populations (Malaysian National Census, 2000). Majority of the population is Iban (37,337 population), followed by Malay (17,748 population) and Chinese (8,626 population). Sri Aman is located on the Sungai Lupar riverbank and divided into two districts, Sri Aman and Lubok Antu. It is one of state rice producer and a trade centre for the rice, timber, oil palm, rubber, and pepper.

Town of Sri Aman is equipped with basic public facilities and government bodies. It has a divisional hospital and thirteen Klinik Desa and Klinik Kesihatan. It does not have specialist service but it does have visiting specialist clinics from Sarawak General Hospital, Kuching. Like any part of Sarawak, infectious diseases like malaria, dengue, tuberculosis is endemic and relevant to its lower to medium income society. Thalassemia is not a problem in this area.

1.3 Literature Review

1.3.1 Definition of hemoglobin and classification of anaemia

Haemoglobin is the iron-containing oxygen-transport in the red blood cells that transports oxygen from the lungs to the rest of the body (i.e. the tissues) where it releases the oxygen for cell use, and collects carbon dioxide to bring it back to the lungs (Ganong, 2003). Haemoglobin is affected by several factors that need to be accounted for when determining whether an individual is anaemic: age, sex, pregnancy, altitude, cigarette smoking and ethnicity (Sullivan, et al, 2008). Haemoglobin concentrations are usually defined as followed: children 6 months - 6 years: 11 g/dl; children 6-14 years: 12 g/dl; adult in males: 13 g/dl; non pregnant females: 12 g/dl; (WHO, 1989) Decrease of haemoglobin, with or without an absolute decrease of red blood cells, leads to symptoms of anaemia.
Uniquely, the threshold haemoglobin value that defines anaemia in pregnancy varies. Some define anaemia according to the trimester: <11.0 g/dl in the first and third trimester and <10.5 g/dl in the second trimester (CDC, 1989). Others use a value of 11 g/dl to define anaemia in pregnancy, regardless of the trimester. In developing countries, mild anaemia is defined as an Hb < 11 g/dl; severe anaemia is diagnosed when Hb is <7 g/dl (Guidotti, 2000).

1.3.2 Anaemia during pregnancy

Anaemia in pregnancy is detected through medical history, physical check-up and specific laboratory tests. Depending upon the degree of anaemia and the time that it develops, antenatal mothers may complain of fatigue, ‘feeling low’, weakness, having less energy for work and sometimes also of cardiovascular problems. During antenatal check-up, such cases are seen to be very pale, with anaemic mucosa in the mouth and on the conjunctiva. In cases of severe anaemia, tachycardia and hypotension are observed and, in rare cases, an enlargement of the heart (Ganong, 2003). Hb levels commonly detected through blood capillary or finger prick test. Venous blood is used if further investigation is needed which require larger volume of blood sample. Following section explain common causes of anaemia:

a) Iron deficiency anaemia

b) Folate deficiency anaemia

c) Dilutional anaemia
Iron deficiency anaemia

Iron deficiency anaemia (IDA) has been one of the most important micronutrient deficiencies in the country since the 1950’s (Tee et al, 1998b). Iron deficiency is believed to be the most common cause of anaemia in pregnancy, therefore, anaemia in a normal pregnant woman in this environment is usually attributed to iron deficiency, and successful treatment is often achieved with iron and folic acid without further investigations (Dim & Onah, n.d.). A study by Singh and colleagues (1998a) found 81.3% of anaemic women at delivery in Singapore have iron deficiency anaemia.

In the human body, iron is present in all cells and has several vital functions which are a carrier of oxygen to the tissues from the lungs in the form of hemoglobin, as a facilitator of oxygen use and storage in the muscles as myoglobin, as a transport medium for electrons within the cells in the form of cytochromes, and as an integral part of enzyme reactions in various tissues (Guyton, 2006). Too little iron can interfere with these vital functions and lead to anaemia (Williams, Evans & Newnham, 1997).

Anaemia is the result of a wide variety of causes that can be isolated, but more often coexist. Globally, the most significant contributor to the onset of anaemia is iron deficiency so that IDA and anaemia are often used synonymously, and the prevalence of anaemia has often been used as a proxy for IDA (WHO, 2001). It is generally assumed that 50% of the cases of anaemia are due to iron deficiency (WHO, 2001) but the proportion may vary among population groups and in different areas according to the local conditions. The main risk factors for IDA include a low intake of iron, poor absorption of iron from diets high in phytate or phenolic compounds, and period of life when iron requirements are especially high (i.e. growth and pregnancy) (Anorlu, Oluwole, & Abudu, 2006).