

## **Anaemia during pregnancy in rural Kelantan.**

**Zulkifli Ahmad<sup>1</sup>, Rogayah Jaafar<sup>1</sup>, M Hashim Mohd Hassan<sup>1</sup>, Mohd Shukri Othman<sup>1</sup>, Azmi Hashim<sup>2</sup>**

<sup>1</sup> *School of Medical Sciences, Universiti Sains Malaysia, 16150 Kota Bharu, Kelantan*

<sup>2</sup> *Department of Health, Kelantan.*

### **ABSTRACT**

A retrospective study of anaemia in pregnancy in rural Kelantan was conducted. The study sample consist of 9,860 mothers who had antenatal care at one of the 102 rural health clinics selected and had delivered a live baby. Anaemia in pregnancy was determined by reviewing the antenatal records for the haemoglobin level recorded at the first and last antenatal visit. Estimation of haemoglobin was done either by photocalorimetric methods or the Sahliís method in these rural clinics. At the time of booking, 47.5% of the mothers were anaemic by WHO criteria (Hb < 11.0 g/dl), with 1.9% having less than 9.0 g/dl. Age of mother, parity and late gestational age at the first antenatal visit were associated with anaemia during pregnancy at the time of booking. However, practise of contraception by the mother did not show any association with anaemia in pregnancy. There were 594 mothers (6.0%) who delivered a baby weighing less than 2.5 kg. There was no association between the low birth weight of the child and the status of anaemia in the mother at the last antenatal visit.

### **INTRODUCTION**

Anaemia still constitutes a public health problem in the world, especially in the developing countries (Royston & Armstrong, 1989, AbouZahr & Royston, 1992). Nutritional anaemia is found more among rural mothers, where poor dietary intake and parasitic infections are more common. Many women start their lives with insufficient iron stores, but also, because of inadequate child spacing, they have little time to build up their iron levels between pregnancies (WHO, 1975). In pregnancy, anaemia has been shown to be associated with an increased risk of maternal and fetal morbidity and mortality (Tasker, 1958; Llewellyn-Jones, 1965; Lourdenadin, 1969; Baker, 1978). However, risk factors such as anaemia in pregnancy can be controlled and monitored by good antenatal care and appropriate action, including referral, in accordance to the level of severity of the anaemia. Kelantan is also one of the most socio-economically underdeveloped state in Malaysia (Kelantan State Economic Planning Unit, 1987). This is a study of anaemia during pregnancy and the factors associated with it among rural mothers in Kelantan.

### **METHODS**

This study constitutes part of a larger study investigating risks of pregnancy in rural Kelantan. It involves 9860 mothers, chosen by proportionate random sampling out of a total of 42,504

mothers delivering in Kelantan during the study period of one year from August 1992 to July 1993. All mothers had antenatal care at one of the 102 rural health clinics selected. Sampling was done by a two stage sampling. A stratified random sampling, where each district represents a stratum and all the health clinics in the stratum were selected while the smaller midwife's clinics were randomly selected so as to obtain a proportionate number of cases to meet the sample size requirements for each district. The cases were then chosen randomly from the antenatal register. The mothers selected were those with singleton pregnancy and who had delivered a live baby. Maternal haemoglobin levels and other relevant data of pregnancy were obtained from the antenatal records. The haemoglobin levels estimated at both the first and last antenatal visits were recorded. Assessment of haemoglobin level were done either by the photocalorimetric methods in the health centres or by Sahli's method in the midwife's clinics. The data were compiled, tabulated and analysed using EpiInfo Version 5 epidemiology and statistics program.

The World Health Organisation defines a non-pregnant woman with a haemoglobin of less than 12 g/dl at sea level as likely to be anaemic. Accounting for the physiological changes in pregnancy, the equivalent value for pregnant women is 11 g/dl or a haematocrit less than 33% (WHO, 1972). However, many studies in tropical or developing countries use 10 g/dl as the threshold which defines anaemia (Tee *et al*, 1984). This study will use 11.0 g/dl as the criteria for anaemia in pregnancy following the WHO recommendations.

## RESULTS

A total of 9860 pregnant mothers were selected comprising of 98.3% Malays, 1.2% Chinese, 0.3 percent Siamese, 0.1% Indian and 0.1% of other races. This is similar to the racial breakdown of the population in Kelantan where 93.5% of the population are Malays. The mean haemoglobin at the first antenatal visit was 11.1 g/dl (range 6.0 - 16.6 g/dl). Using the WHO criterion of haemoglobin less than 11.0 g/dl as indicative of anaemia, 4688 mothers (47.5%) were anaemic, with 188 mothers (1.9%) having a haemoglobin of less than 9.0 g/dl.

The relationship of anaemia to age of mother, parity, gestational age of pregnancy at the first antenatal visit and contraceptive use by the mother are shown in Table 1. The age of the mother is significantly associated with anaemia, with the majority of mothers (56.6%) who are more than 40 years old being anaemic at the first antenatal visit. By parity, 37.5% of the primigravida, 47.1% of the multigravida, 52.9% of the grandmultipara and 64.0% of the great grandmultipara were anaemic. Again, parity is shown to be significantly associated with anaemia. The gestational age of pregnancy during the first visit also show an association with anaemia in pregnancy. Those mothers who register late for antenatal care tend to be anaemic compared to the mothers who register early.

A majority (65.4%) of rural Kelantan mothers have never used modern contraceptives. Only 9.2% of these mothers had a history of contraceptive use. Data was not available in 25.5% of the mothers. There is no significant association between contraceptive use and the status of anaemia in these mothers.

A total of 4688 mothers (47.5%) were anaemic at the first antenatal visit while 3896 mothers

*Anaemia during pregnancy in rural Kelantan*

(39.6%) were anaemic at the last antenatal visit. Table 2 shows the comparison of haemoglobin level at the first and last antenatal visits. The anaemia improved in 2428 mothers (51.8%). Anaemia remained the same in 1938 mothers (41.3%) while in 322 mothers (6.9%), the haemoglobin level decreased during the course of pregnancy. Even though haematinics were given routinely to all pregnant mothers, the status of anaemia during pregnancy showed improvement in only half of the anaemic mothers.

**Table 1.** Factors affecting anaemia in pregnancy among rural mothers in Kelantan

Factors		Level of haemoglobin at first antenatal visit			Chi square (p value)
		< 11.0 g/dl (%)	> 11.0 g/dl (%)	Total (100%)	
Age of mother (years)	<20	198 (47.4)	220 (52.6)	418	25.99 (<0.01)
	20 - 40	4083 (46.8)	4641 (53.2)	8724	
	>40	407(56.6)	311 (43.3)	718	
Parity	Primigravida	636 (37.5)	1060 (62.5)	1696	131.33 (<0.01)
	1-4	2434(47.1)	2732 (52.9)	5166	
	5-9	1435(52.9)	1277(47.1)	2712	
	> 10	183 (64.0)	103 (36.0)	286	
Gestational age at first visit (weeks)	0 - 15	564 (39.7)	855 (60.3)	1419	51.68 (<0.01)
	16–30	3965 (48.5)	4206 (51.5)	8171	
	>30	159 (58.9)	111(41.1)	270	
Contraceptive use by mother	Yes	426 (46.7)	486 (53.3)	912 (8.2)	0.67 (>0.05)
	No	3104 (48.2)	3342 (51.8)	6446 (65.4)	
	Unknown	1158 (46.3)	1344 (53.7)	2502 (25.4)	
Total		4688 (47.5)	5182 (52.5)	9860 (100.0)	

**Table 2.** Comparison of mother's haemoglobin level at the first and last antenatal visit

Haemoglobin level at the last visit	Haemoglobin level at the first visit (g/dl)			Total (%)
	<9	9-10.9	>11.0	
<9	22	88	27	137 (1.4)
9-10.9	102	2447	1210	3759 (38.2)
>11.0	64	1965	3935	5964 (60.5)
Total	188 (1.9)	4500 (45.7)	5172 (52.4)	9860 (100.0)

**Table 3.** Birth weight of child and mother's haemoglobin level at last antenatal visit

Bt wt (kg)	Haemoglobin level at last antenatal visit (g/dl)				Total (%)
	<9.0	9-10.9	Subtotal <11.0(%)	>11.0(%)	
<2.5	6	222	228 (5.9)	366 (6.1)	594 (6.0)
2.5-3.9	119	3283	3402 (87.3)	5192 (87.1)	8594 (87.2)
> 4.0	12	254	266 (6.8)	406 (6.8)	672 (6.8)
Total	137	3759	3896 (100.0)	5964 (100.0)	9860 (100.0)

Chi square test = 0.34, P > 0.05

The distribution of birth weight of the child and haemoglobin level at the last antenatal visit is

shown in Table 3. The incidence of low birthweight (< 2.5 kg) was 6.1%. However, the incidence was higher among mothers who were not anaemic (6.1%) compared to mothers who were anaemic (5.9%). There is no significant association of low birth weight (< 2.5 kg) and the status of anaemia in the mothers.

## DISCUSSION

The main limitation in this study is that the haemoglobin is measured by the Sahli's method in a number of midwife's clinics selected. Photocolorimetry, which is more accurate, was used in the health clinics. Sahli's acid-haematin method is potentially the least accurate method, as it needs a visual comparison of colours. However, it serves as a useful screening test for anaemia in the more rural clinics in Malaysia. A similar method for estimating haemoglobin using an improved colour scale for an acceptable reliability is undergoing field testing for use in areas where there are no laboratory facilities (Stott & Lewis, 1995). The risk approach in antenatal care in use by the Ministry of Health Malaysia requires an accurate estimate of haemoglobin in order to correctly assign a level of risk to the mother. The use of photocolorimetry for haemoglobin estimation is essential for a more accurate basis for risk classification for mothers with respect to anaemia.

The number of pregnant mothers with anaemia in pregnancy (haemoglobin less than 11.0 g/dl during an antenatal visit) found in this study was 4688 (47.5%), with 188 mothers (1.9%) having a haemoglobin of less than 9.0 g/dl. The mean haemoglobin was 11.1 g/dl (Range 6.0 - 16.6 g/dl). Tee *et al* (1984) found a 30 to 40% prevalence of anaemia in pregnancy in Malay mothers from the lower socio-economic strata attending the Maternity Hospital in Kuala Lumpur while Hanafiah *et al* (1996) noted a prevalence of 10 to 55% among antenatal mothers in Selangor. The majority of these mothers were multiparous and would have been prescribed haematinics during previous pregnancies. Yet, almost half of them were anaemic (Hb <11.0 g/dl) at the first antenatal visit. Past iron supplementation may not have prevented anaemia in the current pregnancy. Iron supplementation should be continued even after pregnancy, as there is usually inadequate iron absorption from diet to meet demands of pregnancy without supplementation in this population (DeMaeyer, 1989).

The haemoglobin level improved in 2428 mothers (24.6%). In Malaysia, iron and folic acid supplementation is routinely prescribed in pregnancy. It is anticipated that good compliance to the prescribed iron supplement prevent anaemia during pregnancy. However, the compliance rate among rural mothers in Kelantan is often poor (Sivalingam & Parman, 1988). The haemoglobin level of 2260 (48.2%) mothers showed no improvement during pregnancy. Normally, four types of tablets are given to pregnant mothers in Malaysia, i.e iron, folic acid, vitamin B complex and vitamin C tablets. A study showed that compliance and mean haemoglobin can be increased by giving a single daily dose (Sivalingam & Parman, 1988).

The problem of anaemia in pregnancy can also be prevented by increasing spacing between births through the promotion of contraception. This will help build up any depletion in iron stores. Contraception use is unpopular among rural Malay mothers (Thambypillai, 1982). However, with more of the rural women being educated and being employed, and with the

improved accessibility to health care, contraception use will improve in the future. This process can be accelerated by combining accessibility with effective health education to the rural mothers. However, mothers at high risk should be strongly advised to practise contraception. This advice can be reinforced during both the antenatal and postnatal periods.

Studies of specific causes of anaemia have shown a clearer association with outcomes of pregnancy. Rozkowski *et al* (1966) found increased risk of congenital malformations, stillbirth, neonatal death and low birth weight in babies born to mothers with serum iron deficiency in the third trimester. Ulmer and Gopel (1988) were able to show an association between iron deficiency and preterm labour in their study of 300 pregnancies. However, the association was not so clear when only haemoglobin concentration was considered. In this study, the birth weight was not associated with the status of anaemia in the mother, at both the first and last antenatal visits.

Malaysia has gone a long way towards improving the nutritional status of the population. However, anaemia during pregnancy are regularly detected during antenatal care at the health clinics. A high incidence of anaemia among antenatal mothers at a clinic may indicate the presence of other nutritional problems in the area. The identification of risk areas for nutrition problems in the community will enable the health services to focus their action in these areas, thereby making it more effective in controlling nutrition problems in the community.

## **CONCLUSION**

This study has noted the high prevalence of anaemia in pregnancy among rural mothers in Kelantan. Although haematinics were routinely given, it has not improved the status of anaemia in mothers, probably because of poor compliance. Compliance should be improved by health education, especially in high risk mothers. The dosage can be reduced to a single daily dose, and should be continued, after pregnancy. Contraceptive use among rural mothers will help increase spacing between births, and the time to build up any depletion in iron stores. Any strategy to control anaemia among rural mothers has to improve the measurement technique. With improvement in the health care services in the rural areas, photolorimetry for estimation of haemoglobin level, should be used in all rural clinics.

## **ACKNOWLEDGEMENTS**

This study was supported by funds from the Ministry of Science and Technology Malaysia (Grant No. 323-0501-4150) under the IRPA scheme. The authors wish to thank Pn Shahila, Pn. Azlina and Pn. Roslina and the staff of the clinics under the Ministry of Health who participated in this study. The authors gratefully acknowledge En Ismail Kamaruzaman for his help in preparing the manuscript.

## REFERENCES

- AbouZahr C, Royston E (1992) Excessive hazards of pregnancy and childbirth in the third world. *World Health Forum* 13:343-345.
- Baker SJ (1978) Nutritional anaemia - a major controllable public health problem. *Bulletin World Health Organisation* 56:659-675.
- DeMaeyer EM (1989) Preventing and controlling iron deficiency anaemia through primary health care: *A guide for health administrators and programme managers*. World Health Organisation, Geneva.
- Hanafiah S, Idris MN, Fatimah A, Che Nu MS (1996). Program Intervensi Anemia Ibu Mengandung Di Kuala Lumpur dan Kuala Selangor. *Mal J Med Sciences* 3:2 (Supplement) : 58.
- Kelantan State Economic Planning Unit (1987) Socio-economic profile of Kelantan. Kota Bharu: Economic Planning Unit, Kelantan
- Llewellyn-Jones D (1965) Severe anaemia in pregnancy (as seen in Kuala Lumpur, Malaysia). *Australian and New Zealand J Obstet Gynaecol* 5:191-197.
- Lourdenadin S (1969) Patterns of anaemia and its effect on pregnant women in Malaysia. *Int J Gynaecol and Obstet* 7:234-242.
- Roszkowski I, Wojcicka J, Zaleska K (1966) Serum iron deficiency during the third trimester of pregnancy: maternal complications and fate of the neonate. *Obstet and Gynaecol* 28:820-825.
- Royston E, Armstrong S ed (1989) Preventing maternal deaths. World Health Organisation, Geneva.
- Sivalingam M Parman S (1988) Evaluation of compliance to haemopoietic nutrient supplement in pregnancy. *Haemopoietic Supplementation Research Methodology Workshop*. Unpublished document, Institute of Medical Research, Kuala Lumpur.
- Stott GJ, Lewis SM (1995) A simple and reliable method for estimating haemoglobin. *Bulletin World Health Organisation* 73(3):369-373.
- Tasker PWG (1958) Anaemia in pregnancy. *Med J Mal* 13:3-10.
- Tee ES, Mirnalini K, Jaafar (1984) A Nutritional anaemia in pregnancy: A study at the Maternity Hospital Kuala Lumpur. *Mal J Reprod Health* 2:32-50.
- Thambypillai V (1982) A family planning study in Kuala Pilah, Peninsular Malaysia. *Med J Mal* 37:4:326-335.

*Anaemia during pregnancy in rural Kelantan*

Turmen T, AbouZahr C (1994) Safe motherhood. *Int J Gyne Obst* 46:145-153.

Ulmer and Goepel E (1988) Premature labour contractions and the value of serum ferritin during pregnancy. *Gynaecol and Obstet Investigations* 26:265-273.

World Health Organisation (1972) Nutritional anaemias. Technical Report Series No. 503, Geneva.

World Health Organisation (1975) Control of nutritional anaemia with special reference to iron deficiency. *Technical Report Series No. 580*. WHO, Geneva.