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Factors associated with anaemia among pregnant women in Kegalle district, Sri Lanka

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Abstract

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Maternal nutritional status is an important factor for a better outcome of the pregnancy. Anaemia and being underweight are preventable nutritional deficiencies which should be addressed long before the pregnancy.

This cross sectional analytical study was carried out to determine the prevalence of anaemia during the first trimester of pregnancy and its associated factors among pregnant women in Kegalle district, Sri Lanka. Data were collected using clusters from six MOH divisions comprising 320 pregnant women who were more than 12 weeks of pregnancy. Face to face interviews and maternal health records were used to collect data. Analysis was done through Chi square test and multiple logistic regression to identify the factors related to anaemia in the first trimester.

The results showed a 16.2% prevalence of anaemia during the first trimester of pregnancy. The risk of anaemia at first trimester of pregnancy was found to be prominent with BMI and the age of last child. Pregnant women with low BMI compared to normal BMI and those having a last child below 3 yrs compared to those having a last child over 5 yrs of age had 4 (95%CI:1.79 - 9.79) and 4.6 times (95%CI:1.27 - 16.74) higher risk of having anaemia respectively.

Therefore, birth spacing with a child less than 3 yrs of age and strengthening of pre-pregnancy iron supplementation for expecting women with low BMI (underweight) will be useful modes to prevent future anaemia during the pregnancy.

Keywords: Birth spacing, BMI, Anaemia, Pregnancy

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ปัจจัยที่มีความสัมพันธ์กับภาวะโลหิตจางในกลุ่มหญิงตั้งครรภ์ อำเภอ เคกาล ประเทศศรีลังกา

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ปัจจัยที่มีความสัมพันธ์กับภาวะโลหิตจางในกลุ่มหญิงตั้งครรภ์ อำเภอ เคกาล ประเทศศรีลังกา
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ภาวะโภชนาการของมารดาตั้งแต่ก่อนการตั้งครรภ์ต่อเนื่องไปจนกระทั่งตั้งครรภ์มีผลต่อสุขภาพของมารดาและทารกที่สมบูรณ์ มารดาที่มีภาวะโลหิตจางและน้ำหนักตัวต่ำกว่ามาตราฐาน เป็น ภาวะบกพร่อง ซึ่งควรได้รับการแก้ไขก่อนที่จะมีการตั้งครรภ์ การศึกษานี้เป็นการเก็บข้อมูลแบบภาคตัดขวางเพื่อหาความชุกของภาวะโลหิตจางและปัจจัยที่มีที่มีความสัมพันธ์กับภาวะโลหิตจางในกลุ่มหญิงตั้งครรภ์ในช่วงไตรมาสแรกของการตั้งครรภ์จำนวน 320 คน จาก 6 พื้นที่ของอำเภอ เคกาล ประเทศศรีลังกา การเก็บข้อมูลใช้ข้อมูลจากเวชระเบียนและแบบสอบถาม ทำการวิเคราะห์ข้อมูลโดยใช้ การทดสอบไคสแควร์ และ การวิเคราะห์ถดถอยโลจิสติกพหุคูณ

ผลการศึกษาพบว่าความชุก ของโรคโลหิตจางในช่วงไตรมาสแรกของการตั้งครรภ์ คิดเป็นร้อยละ 16.2 ปัจจัยเสี่ยงของการมีโรคโลหิตจาง ในไตรมาสแรกของการตั้งครรภ์ ประกอบด้วย ค่าดัชนีมวลกาย และอายุของบุตรคนสุดท้าย หญิงตั้งครรภ์ ที่มี ค่าดัชนีมวลกาย น้อยกว่ามาตราฐาน จะมีความเสี่ยง ของการเป็น โรคโลหิตจางสูงกว่าหญิงตั้งครรภ์ ที่มีค่าดัชนีมวลกายปกติ 4 เท่า (95%CI: 1.79 - 9.79) และหญิงตั้งครรภ์ที่มีบุตรคนสุดท้าย อายุต่ำกว่า 3 ปี จะมีความเสี่ยงของการเป็นโรคโลหิตจางสูงกว่า หญิงตั้งครรภ์ที่มีบุตรคนสุดท้าย อายุมากกว่า 5 ปี 4.6 เท่า (95 % CI : 1.27 - 16.74)

ดังนั้นการเว้นช่วงการมีบุตรในผู้หญิงที่มีบุตรคนล่าสุดอายุต่ำกว่า 3 ปี และการเสริมธาตุเหล็กก่อนตั้งครรภ์ในผู้หญิงที่มีค่าดัชนีมวลกายต่ำจึงเป็นสิ่งสำคัญที่สามารถป้องกันโรคโลหิตจางในระหว่างตั้งครรภ์ได้

คำสำคัญ: การเว้นช่วงการมีบุตร ค่าดัชนีมวลกาย ภาวะโลหิตจาง การตั้งครรภ์

Introduction

Nutritional deficiency in individuals most of the time affects not only them but also their pregnancy: e.g. fetus affects from maternal nutritional deficiencies. Iron is the most deficient nutritional factor during the pregnancy[1]. Being an essential element of haemoglobin synthesis, lacking iron is reflected by anaemia. Nearly 41.8% of pregnant women in the world suffer from anaemia during the pregnancy and half of this is due to iron deficiency[2]. Developing countries have 56% of burden of anaemia during the pregnancy, whereas developed countries have 12% of burden of anaemia[3]. According to World Health Organization (WHO), South-East Asia has the highest prevalence of anaemia during the pregnancy out of all other regions[4]. Iron deficiency anaemia is the most common morbid condition during the pregnancy in Sri Lanka[5].

Iron deficiency anaemia detected in early pregnancy is associated with a low energy and iron intake, resulting in an inadequate gestational weight gain[6] over the whole pregnancy and a greater than two-fold increase in the risk of preterm delivery. Other consequences of lack of iron during the pregnancy include more maternal susceptibility to get infections, postpartum haemorrhage, maternal death, reduced immunity[7], intrauterine deaths, learning difficulties in later life[8,9], negative effect on infant motor and cognitive development[9-11], and more proneness to develop iron deficiency during infancy[12,13]. A study has shown that reduction of maternal haemoglobin level to less than 11 g/dl will result in a delay in neurological development in early childhood[9].

Causes directly related to anaemia during pregnancy involve lack of child spacing, multiparty, blood loss and nutritional deficiencies, like iron, folate, vitamin B-12, and vitamin A. Other related factors includes chronic infections, parasitic infections like malaria, hookworm and schistosomiasis[14,15]. These ethological factors responsible for anaemia vary by geographical area[2]. In this study we were interested in analyzing of birth interval and Body Mass Index (BMI) status of pregnant women for occurring of anaemia.

Low birth intervals are associated with many adverse maternal consequences. During and after the pregnancy, mother loses some nutritional stores from her body to pregnancy and breast feeding her child. Association between shorter birth intervals between pregnancies and advanced perinatal outcome may be due to maternal nutrients depletion[16]. Poor pregnancy outcome of having short birth intervals is related to several factors such as socio-economic status, unstable lifestyle, failure to use health care services or inadequate use of such services, unplanned pregnancies, and other behavioral or psychological determinants[17]. Maternal underweight is a state of pre-pregnancy nutritional depletion since childhood or young adulthood. There are many adverse events occurring due to maternal underweight in pregnancy; most commonly premature delivery and low birth weight[18]. Nevertheless, underweight women with anaemia had a higher incidence of low birth weight despite adequate weight gain during the pregnancy[19].

According to the WHO nutritional survey in year 2001, prevalence of anaemia among pregnant mothers was 37.4% in Sabaragamuwa province which includes Kegalle and Rathnapura districts[20]. Kegalle district has 25.08% of underweight pregnancies occurred according to statistics[21]. During the pregnancy iron

supplementation is initiated after the first trimester; therefore, anaemia state in the first trimester and its association factors were considered in this study to improve the maternal health status in early pregnancy.

Methods

This cross sectional study was conducted in Kegalle district, Sri Lanka which has multiethnic and socio-demographic variability. The study include six Medical Officer for Health (MOH) divisions out of eleven MOH divisions in the district. Sample size was calculated with known population size for annual estimate of fourteen thousand and three thundered fifty pregnant women in the district at 95% confidence interval, where Z/2=1.96, prevalence of anaemia 26.2%[5], and 5% of marginal error. By adding extra 10%, final sample size was chosen as 320 subjects. Proportions of pregnant women were selected from each MOH division from the annual estimate. Antenatal clinics were included by randomizing selected MOH divisions with cluster sampling method. Data were collected in April and May, 2015 by a female data collector and the investigator. All pregnant women attending to antenatal clinics were selected. The women with more than 18 yrs old and registered in antenatal clinics before 12 weeks of gestation were included while those who had severe medical illnesses were excluded. Personal interviews and maternal medical records were used to collect data at field antenatal clinics. Anaemia at first trimester was considered when the haemoglobin level falls less than 11 g/dl[1]. Factors such as age, BMI, parity, ethnicity, education, occupation, family income, residence, fish and meat eating frequency, weight, and age of last child were considered in this study.

Ethical consideration

Ethical approval was first granted by the ethical committee of social sciences in Mahidol University and then, by the Sri Lanka Medical Association.

Measurements

Personal data such as age, occupation, education, residence, fish and meat frequency were obtained by face to face interviews, while height, weight parity, age, and weight of last child were obtained by referring to maternal health records at the time of first clinic visit. The haemoglobin values in the first trimester of the pregnancy were taken by the maternal health records and laboratory investigation reports.

Data processing and analysis

Statistical program for social science software version 21 was used to process and analyze data. Descriptive statistics was used to explore the prevalence of anaemia and characteristics of independent variables. Chi square test was used to identify the relationship between independent variables and dependent variable. Multiple logistic regression was used to determine the predicting factors of anaemia at the first trimester of pregnant women.

Results

The mean age of the pregnant women was 29 with SD of 5 yrs. The youngest was 18 yrs while the oldest was 43 yrs. About one fourth of women were younger (25.3%) with age less than 25 yrs old, while more than two third of women in age groups were above 30 yrs (37.2%) and between 26 to 30 yrs (37.5%). Around two fifth of women (42.8%) were in normal BMI category and nearly one third

(29.1%) of women were underweight. About two fifth of pregnant women (41.2%) were in their first pregnancy. When considering the residency of pregnant women, most lived in villages (85.3%), only very few pregnant women were from estates (4.4%), and about ten percent were from town areas. Each three tenth of pregnant women were having a last child less than 3 yrs (32.1%) and more than 5 yrs of age (28.8%). About one fifth of pregnant women (19.8%) had a previous child with birth weight less than 2500 g. Less than one third of pregnant women (29.1%) were used to eat fish or meat more than 7 meals per week while others had fewer meals (Table.2). Nearly half of pregnant women had completed a higher education level, but most of the pregnant women were housewives. Majority of pregnant women included in the study were from Sinhala ethnicity.

Table 1 Prevalence of Anemia (Hb<11g/dl) at 12 weeks of pregnancy.

Anaemia at 12 weeks of pregnancy	Number (n=320)	%
Anaemic	53	16.6
Non Anaemic	267	83.4

Anaemia =Haemoglobin<11g/dl Haemoglobin minimum=8.4 g/dl, maximum = 15.1 g/dl, Mean=11.9, SD= 1.08

The prevalence of anaemia during first trimester is shown in Table 1. Nearly one fifth of pregnant women (16.6%) were having anaemia. Mean haemoglobin level was 11.9 with SD of 1.08. Minimum haemoglobin level was 8.4 g/dl while 15.1 g/dl was the maximum.

Table 2 Socio-economic demographic factors.

Socio-economic demographic factors	Number (n=320)	%
Age groups (Mean = 29, SD=5,Min=18, Max=43)		
>30yrs	119	37.2
26-30 yrs	120	37.5
<25 yrs	81	25.3
BMI category (Before 12 wks of gestation)		
Under weight (<18.5)	93	29.1
Normal BMI (18.5-24.9)	137	42.8
Over weight to Obese (>25.0)	90	28.1
Parity		
1 (No previous pregnancies)	132	41.2
2 (one previous pregnancies)	129	40.3
≥3 (two or more previous pregnancies)	59	18.5
Residence		
Village	273	85.3
Town	33	10.3
Estate	14	4.4
Fish or meat frequency		
< 7 meals per week	227	70.9
≥7 meals per week	93	29.1
Weight of last child C		
No low birth weight (≥2500g)	150	80.2
Low birth weight (<2500g)	37	19.8
Age of last child C		
< 3yrs	60	32.2
3-5yrs	73	39.0
> 5yrs	54	28.8

[C]There were 133 women in their first pregnancy.

Table 3 Association between study factors and anaemia at first trimester of pregnancy.

Factors	Anaemia first trimester				
	n	Yes (%)	No (%)	Crude OR (95% CI)	p-value
Age					
≤25yrs	81	17.3	82.7	1.34(0.62-2.94)	0.46
26-30 yrs	120	19.2	80.8	1.53(0.76-3.06)	0.23
>30yrs	119	13.4	86.6	1	
BMI category					
Under weight(<18.5)	49	32.7	67.3	2.89(1.40-5.98)	0.004**
Normal (18.5-24.9)	181	14.4	85.6	1	
Over weight to Obesity (>25)	90	12.2	87.8	0.83(0.39-1.77)	0.63
Parity					
1	132	15.9	84.1	1.05(0.45-2.46)	0.91
2	129	17.8	82.2	1.21(0.52-2.79)	0.66
≥3	59	15.3	84.7	1	
Residence					
Village	273	16.5	83.5	1.18(0.26-5.47)	0.83
Town	33	18.2	81.8	1.33(0.23-7.59)	0.75
Estates	14	14.2	85.7	1	
Fish and meat frequency					
≥7 meals per week	227	18.1	81.9	1.49(0.74-2.98)	0.26
<7 meals per week	93	12.9	87.1	1	
Weight of last child					
<2500 g	37	18.9	81.1	1.24(0.48-3.20)	0.65
≥2500 g	150	16.7	83.3	1.07(0.57-2.01)	0.84
No child	133	15.8	84.2	1	
Age of last child					
<3yrs	60	23.3	76.7	2.98(0.99-8.94)	0.05
3-5 yrs	73	17.8	82.2	2.12(0.71-6.37)	0.18
>5 yrs	54	9.3	90.7	1	

The association between study factors and anaemia at 12 weeks of pregnancy was calculated using chi square and simple logistic regressions. There was high significant association found between anaemia with BMI, underweight (Crude OR:2.89;95%CI:1.40-5.98) when compared to normal BMI. Pregnant underweight women were 2.8 times more risk-averse to be anaemic during first trimester of pregnancy than pregnant women with normal BMI. There was no significant association found between first trimester anaemia with age, parity, level of education, residence, fish or meat frequency, age, and weight of last child. (Table 3). Furthermore, education, ethnicity, occupation, and family income did not bear any significant associations.

After adjusting the confound factors, Table 4 showed the present significant predictors of anaemia during the first trimester of pregnancy. There was significant association found between age of last child; less than 3 yrs (p=0.02), (Adj. OR:4.61; 95%CI:1.27 - 16.74) and 3-5 yrs of age (p=0.03), (Adj.OR:4.12; 95%CI:1.16 - 14.62) when compared to pregnant women with last child more than 5 yrs old. Pregnant women who had a last child less than 3 yrs old and pregnant women with last child 3 to 5 yrs old were respectively 5 and 4 times more likely to be anaemic than those who had a last child more than 5 yrs old. There was high significant association found between anaemia with BMI; underweight (p=0.001) (Adj. OR:4.18; 95%CI:1.79 - 9.79) when compared to pregnant women with normal BMI. Underweight pregnant women were 4 times more risk-averse to be anaemic at first trimester of pregnancy than pregnant women with normal BMI (Table 4).

Table 4 Multiple logistic regression of anaemia at 12 weeks of pregnancy.

Variables[#]		Adj.OR	95% CI. for OR		
			Lower	Upper	p-value
BMI category	Under weight (<18.5)	4.18	1.79	9.79	0.001**
	Normal (18.5-24.9)	1			
	Overweight to Obesity(≥30)	0.88	0.39	1.98	0.77
Residence	Village	5.79	0.82	41.14	0.08
	Town	6.97	0.82	59.67	0.08
	Estates	1			
Fish and meat	>7 meals per week	1.78	0.84	3.79	0.13
frequency	<7 meals per week	1			
Age of last child	<3yrs	4.61	1.27	16.74	0.02*
	3-5 yrs	4.12	1.16	14.62	0.03*
	>5 yrs	1			

*p-value<0.05 **p-value < 0.01

[#] Controlled for covariate factors including age, parity, family income, occupation, and weight of last child

Discussion

This study showed that about 16.2% of pregnant women were anaemic during the first trimester. According to the WHO Global database, the available data for anaemia in Sri Lanka at first trimester of the pregnancy was given as 13.2%[20]. The result from our study shows a smaller increase in prevalence of anaemia during the first trimester of pregnancy in Kegalle district in comparison to the WHO database anaemia state in the first trimester. Marked prevalence of anaemia about 93.2% was reported in India in a hospital based study in rural Krishna[22]. According to WHO nutritional survey, India has 49.2% prevalence of anemia during the pregnancy[2]. A study had shown that anaemia in the first trimester was associated with low birth weight of the baby but not in second and third trimester[23].

Body Mass Index (BMI) of underweight (<18.5) and having a last child less than 5 yrs of old were found to be associated with anaemia at first trimester of pregnancy in this study. Underweight is generally associated with nutritional deficiency and low nutritional stores in the body; therefore, these women invariably got iron deficiency which may lead to anaemia[24] during the pregnancy before starting the iron supplementation at first trimester. In Kegalle district nearly one third of pregnant women (32.7%) were underweight which was higher than the reported values for both Kegalle district (25.08%) and the national underweight which is about 23.00%[21]. So there may be high rate of

female adolescent nutritional deficiencies taking place in the district. These maternal nutritional deficiencies may result in poor outcome of the pregnancy. A study done in India has showed that underweight was significantly associated with anaemia during the pregnancy[25]. A literature review study in South-East Asia region revealed that anaemia was associated with underweight of pregnant women[26].

Pregnant women who got a last child less than 5 yrs old were significantly associated with anaemia during the pregnancy compared to pregnant women with a last child more than 5 yrs old. This indicates that these women had loss some iron stored in their body for their previous pregnancy. Pregnancy is a physiological state which needs more iron. Having a child sooner than later might have been resulted in using more stored iron in the body. But even after 5 yrs the iron stores may have not come to their optimum level to face the demand of next pregnancy. There might be a lack of iron from the diet and supplementation during post partum and lactation period. According to a population report from WHO, 3 to 5 yrs birth spacing was favorable for infant survival[27]. Even though, the pregnant women in this study group had high risk for developing anaemia after 3-5 yrs last child birth. A study done in Jordan has revealed that lower the birth interval leading to higher the iron deficiency anaemia in pregnant women[28].

Conclusion

Anaemia during early stage of pregnancy may not initiate better productivity of future. Anaemia at pregnancy is related to underweight and having a child less than 5 yrs of age. Value of optimum family planning, together with more concern of pre-pregnant iron supplementation for underweight and birth space of less than 5 yrs for expectant women need to be considered in pre-pregnancy counseling to eliminate iron deficiency before the beginning of a pregnancy. As a long term basis, elimination of female adulthood underweight might be useful in preventing anaemia during pregnancy.

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