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TO ASSESS THE MATERNAL ANAEMIA, INTRA-UTERIAN GROWTH RESTRICTION AND NEONATAL OUTCOME IN TERTIARY CARE HOSPITAL, BIHAR

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Abstract

Aim: To assess the maternal anaemia, intra-uterian growth restriction and neonatal outcome.

Materials and methods: a prospective, observational study conducted in Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar India. A total of 240 consecutive clinically suspected cases of IUGR with singleton pregnancies at 34-40 weeks of gestation were included in the study. Their socio-demographic profile and hemoglobin levels were recorded. A descriptive analysis of the data was performed.

Results: Of 240 study subjects with IUGR at 34-40 weeks, 70.4% were anaemic, (48.8% had mild, 20.8% had moderate, 0.83 % had severe anaemia) while 29.6% were not anaemic. Significantly, the ratio of anaemic to non anaemic in antenatal IUGR pregnancies was 2.48:1. A birth weight of less than 2.5 kgs was recorded in 84% of pregnancies with moderate anaemia and 83.8% pregnancies with mild anaemia. Out of the 240 clinically diagnosed cases of IUGR 71.25% (n=171) were from the rural background and 28.75% (n=69) were urban area.

Conclusion: Mild to severe anaemia in IUGR may increase the chances of low birth weight and adverse neonatal outcomes but larger studies with standardized definitions and measurements of exposure outcomes to bring about uniformity are required to determine an accurate assessment of association between low maternal hemoglobin and IUGR

Introduction

Anemia is characterized as a "low level of hemoglobin in the blood, as evidenced by a reduced quality or quantity of red blood cells," which impairs oxygen delivery to the tissues. The WHO uses the following hemoglobin cut offs to define anemia in pregnant women: 100 to 110 g/L for mild anemia, 70 to 100 g/L for moderate, and 70 g/L for severe.[1] Decreased erythrocyte production, increased loss of erythrocytes, or a combination leads to anemia; determinants of these causes include nutrition (i.e., iron deficiency, folic acid deficiency), infectious disease (i.e., malaria, helminthes), and genetic disorders (i.e., thealassaemias).[2] In developing countries, pregnant women are at high risk of experiencing anemia and associated complications due to the combined effect of the physiological demands of pregnancy and the high prevalence of aforementioned etiologies. The United Nations Standing Committee on Nutrition estimated anemia prevalence to be 40–50% in developing countries in pregnant and nonpregnant women of reproductive age.[3]

During pregnancy, hemodilution also affects maternal hemoglobin measures. Plasma volume expands to facilitate uteroplacental circulation, and proper expansion has been associated with better pregnancy outcomes.[4] With the plasma volume increase, the hemoglobin concentration falls until around the late second to early third trimester, then increases slightly around wk 30, when production of RBC mass catches up.[5,6] The estimated hemoglobin reduction from prepregnancy to mid-pregnancy is ~15 g/L.[7] For this reason, early pregnancy measures of hemoglobin may most accurately reflect the mother's prepregnancy hemoglobin levels. Assessment of period of gestation i.e. attitude, presentation of foetus, foetal heart sound were done in each antenatal visit, height of fundus and grith of abdomen in centimetres were measured from 20 and 30 weeks respectively, every fortnightly. Ultrasonographic obstetrical examination was done in the first trimester to confirm the gestational period and subsequently at 16, 24, 28, 32 and 36 weeks of gestation to measure the biparietal diameter, head and abdominal circumference and amount of liquor amni. Monitoring of foetal growth was done clinically by noting the maternal weight gain, height of uterus and girth of abdomen by ultrasonography. Decision regarding delivery was taken in between 36-38 weeks depending on certain jeopardy of fetoplacental unit with

special consideration to pediatric attention and monitoring system during labor.

The causes of IUGR are varied and may relate to placental insufficiency with the placenta unable to keep up with the growing demands of the fetus.[8] A possible mechanism suggested for IUGR in women with anaemia is that low hemoglobin levels restrict oxygen circulation in the body, thus creating an environment of oxidative stress or chronic hypoxia, which could then cause fetal growth restriction. Another reason, specific to iron deficiency anaemia pertains to an increased production of norepinephrine in iron deficient states, stimulating the production of corticotropin-releasing hormone. This in turn increases cortisol production which may possibly restrict fetal growth.[9] Hence the present investigation was aimed to assess the maternal anaemia, intra-uterian growth restriction and neonatal outcome in tertiary care Hospital, Bihar.

Material and Methods

This was a prospective, observational study over a period of one year was conducted in the Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India.

A total of 240 consecutive clinically suspected cases of IUGR with singleton pregnancies at 34-40 weeks of gestation were included in the study. A consent form fills by the patients.

Methodology

A detailed antenatal history, socio-demographic factors and obstetric history was obtained. The socio-economic status was calculated based on modified Kuppuswamy scale 2019.

The BMI was calculated based on the standard weight and height recorded using a calibrated weighing scale. The hemoglobin levels were estimated by the cyanmethemoglobin method and recorded.

The classification of anaemia was based on the WHO criteria; hemoglobin (Hb) concentration of <11 g/dl during pregnancy was considered as anemia and graded as mild, moderate, and severe anemia depending upon the Hb concentration in the range of 10–10.9, 7–9.9, and <7 g/dl respectively.

The gestational age was determined on the basis of last menstrual period if patient was sure of her dates or by first trimester ultrasound if available.

The clinical diagnosis of IUGR was made on the basis of poor maternal weight gain and a non- correspondence with the period of gestation and an ultrasound.

All the patients were followed up until delivery. After delivery, the birth weight, APGAR score after 5 minutes and any adverse perinatal outcome in terms of asphyxia, hypoglycaemia, perinatal death or admission & stay in NICU were noted.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations were calculated.

Results

Table 1: Hemoglobin levels to diagnose anemia at sea level (WHO criteria)

Pregnancy Status	Non-Anemia (g/dl)	Anemia g/dl		
		Mild	Moderate	Severe
ant women (15 to 49 years)	≥11	10–10.9	7–9.9	< 7
Non-pregnant women (15 years or above)	≥12	11–11.9	8–10.9	< 8

Table 2: Sociodemographic profile of the study population

Variable	Frequency	Percentage
Age Group		
< 18	23	9.6 %
19-30	191	79.6
above 30	26	10.8
Family structure		
Joint	186	77.5
Nuclear	54	22.5
Alcoholic and Smoking Habits		
Alcoholic and Smoker	2	0.8%
Non alcoholic and non smoker	238	99.2%
Respondent Education		
up to 10th	44	18.3%
above 10th	196	81.6%
Working statues		
non working	145	60.4%
Working	95	39.6%
Socioeconomic Class		
Upper middle	67	27.9%
Lower Middle	122	50.8%
Upper lower	51	21.3%

Table 3: Maternal Anaemia and residential status

Variable	Non-anemic	Anemia			Total
		Mild	Moderate	Severe	
Urban	21	27	21	0	69 (28.75%)
Rural	50	90	29	2	171 (71.25%)
Total	71	117	50	2	240 (100%)

Table 4: Association of maternal Anaemia in clinically diagnosed cases of IUGR and birth weight

Birth weight	Anaemia			No Anaemia 11g/dl or higher	Total N (%)
	Mild 10-10.9 g/dl	Moderate 7–9.9 g/dl	Severe <7 gm/dl		
≥ 2.5Kgs	19	8	0	8	35 (14.6%)
≥ 2.5 Kgs	98	42	2	63	205 (85.4%)
Total	117	50	2	71	240 (100%)

Discussion

The literature on the correlation of maternal anemia in IUGR pregnancies and neonatal mortality and morbidities is limited. Both anaemia and IUGR individually are responsible for adverse neonatal outcomes. Hence, the aim of this study was to decipher any significant association between maternal anaemia in clinically diagnosed IUGR pregnancies and neonatal outcomes. In our study, anaemia was classified according to the WHO criteria [10]. The ratio of anaemic to non-anaemic IUGR pregnancies was 2.48:1. In our study 70.4% were anaemic, (48.8% had mild, 20.83% had moderate, and 0.83% had severe anaemia) while 29.6% were not anaemic. In antenatal women with IUGR from rural areas, anaemia was noted in 70.8 which corresponds to several studies done in rural Karnataka that report a prevalence of 64% in Kolar and 72.5% in Belagavi.[11,12] However, in urban areas the burden of anaemia was 69.6% which was higher than the prevalence rate of 50.1% found in urban Udupi.[13]

Several factors contribute to causation of anaemia during pregnancy; geographical location, dietary practice, access to medical services, pre-pregnancy haemoglobin levels and cultural practices. In our study, socio-demographic factors did not appear to be significantly associated with anemia although a younger age and a lower socio-economic status are known to be associated with anemia as revealed in other studies.

The effect of maternal anaemia on the foetus show that with varying degree of anaemia the level of decompensation in the fetus also varies. Maternal haemoglobin below 8.0 g/dl is associated with significant fall in birth weight due to increase in prematurity rate and intrauterine growth retardation.[14] Besides Hb level 11.0 g/dl is associated with a significant rise in perinatal mortality rate.[15] In our study the mean birth weight The mean birth weight was 1.87 kg. The minimum birth weight was 850 gm and the maximum birth weight was 3.250 kg. A birth weight of less than 2.5 kgs was recorded in 84% of pregnancies with moderate anaemia and 83.8 % pregnancies with mild anaemia. Some studies report that maternal anaemia diagnosed at entry to prenatal care was associated with low dietary energy and iron, inadequate gestational weight gain, and two fold or greater increase in the risk of preterm delivery and LBW.[16,17] A few studies have looked into the effects of anaemia, IUGR and neonatal outcomes. In a meta-analysis, maternal anemia determined in the first and second trimesters is significantly associated with preterm birth but not with low birth weight.[18] In yet another meta-analysis, which included just three studies no association between hemoglobin <100–110 g/l and IUGR was found. The meta-analysis revealed that moderate to severe anemia (<90 or <80 g/L) was significantly associated with SGA, whereas there was no relationship with milder anemia.[19] The associations reported in this meta-analysis are to be viewed with great care, as there is heterogeneity in methods and definitions.

Conclusion

Both anemia and IUGR are a multifactorial disease condition. Individually both have reported to have negative maternal and child health effects. Both are associated with increased risk of preterm births and low birth weight babies. In order to accurately determine the association between maternal anaemia, IUGR and neonatal outcomes, large multicentric prospective studies with standardization of definitions and measurement of exposure outcomes are required to interpret the results uniformly.

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