Obstetric factors associated with anaemia in pregnancy in a primary health center in south-south Nigeria

Ndukwu Geraldine *, Dienye Paul and Adesokun Bolanle

Department of Family Medicine, University of Port Harcourt Teaching Hospital, Rivers State, Nigeria.

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Abstract

Anaemia has been reported as one of the commonest medical complications associated with pregnancy in the developing countries. It increases maternal, fetal and neonatal morbidity and mortality significantly. In Nigeria, maternal anaemia usually predates the period of pregnancy in the life of most of the mothers. These women succumb to early unprepared marriage, give birth to many children with poor child spacing and due to poverty and ignorance they book late for antenatal. This study determines the obstetric factors associated with anaemia in pregnancy in a primary health centre in Port Harcourt in order to create awareness on maternal anaemia and the need to institute preventive and therapeutic measures.

Methods: This is a cross-sectional; hospital- based study. A total of two hundred and twenty-seven pregnant women attending the antenatal clinic were enrolled into the study at booking in a primary health centre. Data was collected by administering questionnaires. Blood sample was collected for haemoglobin estimation. Means were compared using z-test and statistical significance was set at P<0.05.

Results: Out of the 227, 111(48.9%) were primigravida, most of whom were anaemic (65.8%). Majority of the women booked in the second trimester 135 (59.3%) and those that booked at the third trimester were more anaemic (70.9%). Pregnant women with birth interval of <1(66.7) and > 4years (78.6%) were mostly anaemic.

Conclusion: Anaemia in pregnancy especially for those living in developing countries can be reduced if women are educated on the need for proper nutrition before pregnancy and on early ante-natal booking.

Keywords: Maternal health; Anaemia; Primary health care; Ante-natal booking; Parity

1. Introduction

Anaemia in pregnancy although preventable is a known public health problem world-wide especially in developing countries [1, 2]. It has been reported as one of the commonest medical complications associated with pregnancy in the third world countries [1, 2]. Among the 58.27million pregnant women estimated to be anaemic in the world, 96% of them are living in the developing countries and only 4% in developed nations [3]. According to the world health organisation (WHO), anaemia is said to occur whenever the haemoglobin level is less than 12 g/dl or a haematocrit of 36% in a non-pregnant woman at sea level. Due to the physiological changes in pregnancy, the equivalent value for pregnant women is 11 g/dl or a haematocrit less than 33%. [4, 5].

In pregnancy, anaemia has been shown to be associated with an increased risk of maternal mortality and morbidity [6-9]. About 99% of deaths that occur each year from pregnancy related causes are mostly in the developing countries and...
2-12% of these deaths in Africa is primarily due to anaemia [10,11]. In Nigeria, studies have proved that anaemia contributes to the high rate of maternal mortality and morbidity recorded in the country [2,12-14]. Maternal deaths attributed to anaemia in pregnancy in Nigeria ranges from 14.6% to 20% [11,15,16]. Other maternal complications linked with anaemia are: poor weight gain, premature labour, increase in operative delivery, blood transfusion and poor anaesthetic risk [7,8]. Maternal anaemia also affect the baby in the womb. Such fetal complications include preterm delivery, low birth weight and perinatal mortality [7,9,17].

The causes of anaemia in pregnancy are multiple especially in developing countries like Nigeria. [18-20]. Mostly the cause of anaemia in pregnancy in these areas is attributed to dietary deficiency especially iron, folate and vitamin B12. [17,21,22]. Many of these women start out in life with insufficient iron store which is further compromise by exposure to repeated infection and infestation from malaria, other micro-organisms, helminthiasis and HIV lately. [23-27]. The problem of insufficient iron store in females early in life is not peculiar to developing nations like Nigeria only but is more pronounce in these areas because of poverty [28,29]. Several studies reported that many women and young adolescent are already anaemic by the time they become pregnant and a great percentage of them are from developing nations when compared to women in wealthier countries [28,29].

There are obstetric factors that are associated with maternal anaemia. Such factors are maternal age at index pregnancy, gestational age of index pregnancy, parity, booking status and birth interval [11,30,31]. It is a well-documented fact that extremes of age (adolescent and women above 40 years) have been associated with anaemia in pregnancy with many of these studies showing that anaemia is more common in adolescence than adult women [11,30,32,33]. Apart from the maternal age the association between gestational age of pregnancy and anaemia has been widely studied [11,30,32-35]. In normal pregnancy, there is an increase in the total blood volume different from that in the non-pregnant state. This starts by the first and reaches its peak by the second trimester (20 weeks). The haemoglobin concentration remains fairly constant up to 30 weeks and then rises slightly thereafter, although not usually getting to pre-pregnancy or early pregnancy level. These changes lead to an increase in the red cell volume by 18-25% above the non-pregnant state depending on the iron status of the individual and the plasma volume increases by 46-55% [36,37]. Thus it can be seen that there is an unequal plasma/red cell volume expansion leading to haemodilution. [38]. This is also called the physiological anaemia of pregnancy [36-38]. In most of the studies, because of the effect of physiological haemodilution, of pregnancy the relationship of gestational age of pregnancy with development of anaemia shows a U shape curve being highest by the second trimester [39]. However, the requirement for micro-nutrients increases as pregnancy progresses and with inadequate intake will result in anaemia even in the later part of pregnancy this was in accordance with the WHO report in which anaemia is said to be significantly higher in the third trimester of pregnancy [40,41]. In most studies carried out in Nigeria, it was evident that anaemia is more common in the second trimester [42,43]. Parity have also been associated with maternal anaemia with studies reporting increased incidence of anaemia in primigravidae than grand-multiparity [11,30]. In developed countries with universal access to ante-natal care and skilled attendant at delivery, high parity is no longer considered a risk marker for pregnancy complication [40,44]. However, women, especially those in the low socioeconomic group, who embark on successive pregnancies at too frequent intervals, have been found to develop anaemia in pregnancy [44,45]. This is because Pregnancy and childbirth usually deplete iron and folic acid stores and a woman needs time after delivery to replenish stores of these micronutrients [45,46].

Reduction of maternal mortality is a priority under goal three of the sustainable development goals (SDG) which is “ensure healthy lives and promote well-being for all at all ages.” In 2015, the World Health Organization published a direction-setting report outlining global targets and strategies for reducing maternal mortality under the SDG. The national target is for countries to have their maternal mortality ratio reduced by at least two-thirds by 2030 from their 2010 baseline [47]. Anaemia having been shown to be one of the causes of maternal mortality can be prevented by simple cost effective interventions [2]. The knowledge of the different causes of maternal anaemia and their relative importance should form the basis for intervention and strategies to control anaemia [1,18]. Few studies have been carried out in the area of current study on the factors associated with anaemia in pregnancy and most of them were done at the level of tertiary and secondary health institution. No studies have been done at the primary care level on anaemia and on obstetric factors that lead to it in pregnancy in the area of current study. The present study therefore, is carried out to determine the association between some obstetrics factor and anaemia in pregnancy in a Primary health care centre in Port Harcourt, Rivers state.

2. Methodology

2.1. Study design

This is a cross-sectional; hospital-based study.
2.2. Study area
The primary health centre is located within the premises of the Rivers State College of Health Science and Technology, KM 6 Ikwerre road Rumueme, Port Harcourt Nigeria. Port Harcourt is the capital of Rivers State. It is located in the South-South geopolitical zone of Nigeria along the Bonny River. [48].

2.3. Sample collection
Pregnant women attending ante-natal clinics in the primary health care centre were enrolled in the study at the time of booking. Only subjects who gave their consent and booking for the index pregnancy were admitted into the study. Two hundred and twenty-seven pregnant women were selected by simple random sampling using a computer-aided table of random numbers. Questionnaires were administered to the pregnant women to obtain their demographic and obstetrics history. Blood samples were taken from the women for haemoglobin estimation. This was done using a portable hemoCue machine.

2.4. Ethical consideration
Approval for this study was obtained from the Ethical Committee of College of Health Sciences and Technology, Port Harcourt before the commencement.

2.5. Data analysis
Responses to questionnaires and levels of haemoglobin were coded and entered into a data base using SPSS version 23 for analysis and graphs were drawn using Excel software. Means were compared using z-test. The association between anaemia and obstetric factors were compared using chi-Square test and statistical significance was set at P<0.05.

3. Result

3.1. Age distribution of the respondents
Two hundred and twenty-seven pregnant women were involved in the study. The ages of the respondents ranges from 16 – 40 years with a mean age of 26.8 ± 4.3. Most of the women that booked for ante-natal care were between the ages of 26 – 30 years (42.3%).

![Figure 1 Age distribution of respondent](image)

3.2. Obstetric history of respondents
Majority of the pregnant women in the hospital booked for ante-natal care in the second trimester. Half of the pregnant women that booked for ante-natal in the centre were primigravidae. A birth interval of 1 - 2 years was predominant among the respondents and Birth interval of less than one year was not very common.
Table 1 Obstetric history of respondents.

| Characteristic                        | Number | Percentage (%) |
|---------------------------------------|--------|----------------|
| Gestational age of Respondents        |        |                |
| First trimester                       | 37     | 16.4           |
| Second trimester                      | 135    | 59.3           |
| Third trimester                       | 55     | 24.3           |
| Parity                                |        |                |
| Primigravidae                         | 111    | 48.9           |
| Multigravidae                         | 116    | 51.1           |
| Birth interval                        |        |                |
| <1 year                               | 6      | 5.2            |
| 1-2 years                             | 79     | 68.1           |
| 3-4 years                             | 17     | 14.7           |
| >4 years                              | 14     | 12.0           |

3.3. Association between obstetric factors and anaemia in pregnancy

Anaemia was found to be predominant in women who booked for ante-natal in the third trimester than the other trimesters. However, the association between gestational age at booking and anaemia in pregnancy was not statistically significant ($X^2 = 2.42, p = 0.30$). In the current study, anaemia in pregnancy was found to be more predominant in primigravidae than in multigravidae. Anaemia was observed to be more common in women with birth interval of less than 1 year and more than 4 years. The association between birth interval and anaemia in pregnancy was not statistically significant ($X^2 = 3.386, p = 0.336$).

Table 2 Association between obstetric factors and anaemia in pregnancy.

| Character     | Number (%) anaemic | Number (%) not anaemic | $X^2$ | P-value |
|---------------|--------------------|------------------------|-------|---------|
| Gestational Age |                   |                        |       |         |
| First trimester | 21 (56.8)         | 16 (43.2)              |       |         |
| second trimester | 81 (60.4)         | 53 (39.6)              | 2.417 | 0.299   |
| third trimester | 39 (70.9)         | 16 (29.1)              |       |         |
| Parity*        |                   |                        |       |         |
| Primigravidae  | 73 (65.8)         | 38 (34.2)              | 1.23  | 0.267   |
| multigravidae  | 68 (58.6)         | 48 (41.4)              |       |         |
| Birth interval:|                   |                        |       |         |
| < 1 year       | 4 (66.7)          | 2 (33.3)               |       |         |
| 1-2 years      | 46 (58.)          | 33 (41.8)              | 3.386 | 0.336   |
| 3-4 years      | 8 (47.1)          | 9 (52.9)               |       |         |
| >4 years       | 11 (78.6)         | 3 (21.4)               |       |         |

Odds ratio for parity is 1.35; 95% CI = 0.791-2.324
4. Discussion

Majority of the pregnant women in this study booked for ante-natal care in the second trimester [49]. This is similar to reports from studies in this country and other developing nations in which it was found that the mean gestational age at booking in Africa is from 20-28 weeks [11,49,50]. Although, pregnancy is a short time to correct maternal anaemia adequately especially if patients book late however, Ante-natal care has been shown to reduce the incidence of anaemia in pregnancy when education on nutrition, social and behavioral services is provided along with medical care [41]. On the other hand, early booking by pregnant women will provide a time interval adequate enough to allow the full benefits of ante-natal care to manifest [11,30].

The late booking for ante-natal care might be connected with the high prevalence of anaemia recorded in the developing nations. This was also the case with the current study with the prevalence of anaemia high among women that booked in the third trimester (70.9%), followed by those that booked in the second trimester (60.4%), compared to those that booked in the first trimester (56.8%). The physiological haemo-dilution that takes place during pregnancy reaches its peak during the second trimester and may account for the increase in anaemia seen at this time in pregnancy. Also the increased demand for micro-nutrient in pregnancy increases as the pregnancy progresses.

The relationship between parity and pregnancy complications continues to be of interest to obstetricians. [11,30,31]. However, studies have reported increased incidence of anaemia in primigravidae than multiparity. [11,30], this is similar with the findings in this study in which primigravidae were found to be at a higher risk of developing anaemia in pregnancy than multigravidae (Odds ratio for parity is 1.35; 95% CI = 0.791- 2.324). Although, some other researchers found no association between parity and maternal anaemia [42].

Various studies have revealed that the prevalence of anaemia was significantly higher in those women with less than a year interval between pregnancies. [51,52]. Pregnancy and childbirth usually deplete iron and folic acid stores and a woman needs time after delivery to replenish stores of these micronutrients. However, women, especially those in the low socioeconomic group, who embark on successive pregnancies at too frequent intervals, do not give their bodies enough time to do this and this may be responsible for the high prevalence of anaemia found among them. [51,52]. The current study however, did not find any significant association between anaemia and birth interval, although anaemia was high in women that had more than 4 years and less than 1 year.

5. Conclusion

This study has shown that majority of the pregnant women booked for ante-natal care in the second trimester and the risk of developing anaemia was higher among the primigravidae, women with less than a year interval between pregnancies and those at the third trimester. Anaemia in pregnancy can be successfully eradicated especially in developing countries if women are encouraged and made aware of the need to book for ante-natal early and proper child spacing by utilizing the family planning methods. Also, emphasis needs to be placed on pre-pregnancy programmes which will gear towards educating women on healthy lifestyle which also includes healthy eating that can lead to increase maternal iron stores. Women empowerment is very important, so that the women on their own can take care of their health and basic nutritional needs.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

There are no conflicts of interest.

Statement of informed consent

The details of the study were thoroughly explained to all women booking for ante-natal care during the health talk session at the beginning of the clinic. Informed written consent of the respondents was obtained before involving them in the study.
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