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Original Research Article

Haematological profile of pregnant women in Umuahia, Abia State, Nigeria

Obeagu Emmanuel Ifeanyi[1*], Obarezi Thompson Ndubuisi[2], Eze Obioma Benedeth Leticia[3] and Emelike Chinedum Uche[1]

[1]Diagnostic Laboratory, University Health Services Department, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria
[2]University Health services Department, Michael Okpara University of Agriculture, Umudike, Abia state, Nigeria
[3]Department of Biochemistry, University of Nigeria, Nsukka, Nigeria
Corresponding author

Keywords

Pregnant women; Haemato-logical profile.

A B S T R A C T

Every stage of pregnancy is unpredictable and each pregnancy comes with different presentation but there should be known mean changes in some of the haematological profile and that is why this study was done to help all involved with care of pregnant women to know some of these changes and the proper ways to handle them.80 subjects were chosen for the study.40 subjects were pregnant women and 40 were non-pregnant women with average age of 27.3 years ranging from 19-34 years.The study showed significant changes($P<0.05$) in mean values of BC,HCT,MCV,MCH,WBC,Lymphocytes,Monocytes,Eosinophils of the pregnant women relative to non-pregnant women.There were significant changes($P<0.05$) between the trimesters in most of the parameters showing carefulness with pregnant women at any stage of the pregnancy.

Introduction

Pregnancy is the fertilization and development of one or more offspring, known as an embryo or fetus, in a woman's uterus. It is the common name for gestation in humans. Childbirth usually occurs about 38 weeks after conception in women who have a menstrual cycle length of four weeks, this is approximately 40 weeks from the start of the last normal menstrual period(LNMP).An embryo is the developing offspring during the first 8 weeks following conception and subsequently the term fetus is used until birth(MedicineNet,2011). In many societies pregnancy is somewhat arbitarily divided into three trimester periods, as a means to simplify reference to the different stages of prenatal development. The first trimester carries the highest risk of miscarriage. During the second trimester, the development of the fetus can be more easily monitored and diagnosed. The beginning of the third often approximates the point of viability or the

ability of the fetus to survive, with or without medical help, outside of the uterus (Medicine Net, 2011).

In the United States and United Kingdom,40% of pregnancies are unplanned, and between a quarter and half of those unplanned pregnancies were unwanted pregnancies (BBC News 16 March, 2004 and Jayson,2011).Of those unintended pregnancies that occurred in the U.S.,60% of the women used birth control to some extent during the month pregnancy occurred.

During pregnancy the woman undergoes many physiological changes, which are entirely normal, including cardiovascular, haematological, metabolic, renal and respiratory changes that become very important in the event of complications. The body must change its physiological and homeostatic mechanisms in pregnancy to ensure the fetus is provided for. Increases in blood sugar, breathing and cardiac output are all required. Levels of progesterone and oestrogens rise continually through out pregnancy, suppressing the hypothalamic axis and subsequently the menstrual cycle.

The fetus inside pregnant woman may be viewed as an unusually successful allograft since it genetically differs from the woman (Clark et al, 1986).The main reason for this success is an increased maternal immune tolerance in pregnancy can also cause an increased susceptibility to and severity of some infectious diseases.

Pregnancy is typically broken into three periods or trimesters, each of about three months (Collins English Dictionary, 2012 and American Heritage Dictionary,2000).Obstetricians define each trimester as lasting for 14 weeks, resulting in a total duration of 42 weeks, although the average duration of pregnancy is actually about 40weeks (Cunnigham et al.,2010).Where there are no hard and fast rules, these distinctions are useful in describing the changes that take place over time.

Pregnancy detection can be accomplished using one or more various pregnancy test(National Health Service,2010) which detect hormones generated by the newly formed placenta, serving as biomarkers of pregnancy. Blood and urine tests can detect pregancy 12 days after implantation(Qasim et al,1996).Blood pregnancy test are more sensitive than urine tests. Home pregnancy tests are urine tests, and normally detect a pregnancy 12-15 days after fertilization. A quantitative blood test can determine approximately the date the embryo was conceived. Testing 48 hours apart can provide useful information regarding how the pregnancy is doing. A single test of progesterone levels can also help determine how likely a fetus will survive in those with a threatened miscarriage (Verhaegen et al, 2012).

Each year, according to the WHO, ill-health as a result of pregnancy is experienced by more than 20 million women around the world. Furthermore, the lives of eight million women are threatened, and more than 500,000 women are estimated to have died in 1995 as a result of causes related to pregnancy and birth (WHO,2009).

The haematological profile of an individual to a large extent reflects their general health(WHO,2004) and many studies have identified the haematological profile of the pregnant women as one of

the factors affecting preganacy and its outcome (National Institue for Clinical Excelence, 2007, Klebanoff et al.,1991, Allen, 2000, Meng et al.,2008, Reveiz et al.,2007, Bothwell and Charlton,1981 and Tamaika et al.,2008). The most commonly referred to of the haematological indices are the indicators of haemoglobin concentration, and low haemoglobin (anaemia) is the most widely identified haematological abnormality(CDC,1998) and is associated with adverse pregnancy outcome (Klebanoff et al., 1991, Allen,2000,Meng et al., 1991 and Tamaika et al,2008). Anaemia is a common and serious problem in pregnancy and needs to be addressed (WHO, 2007).

Pregnancy outcome is influenced by many factors some of which include culture, environmental, socioeconomic status and access to medical care. The haematological profile of pregnant women also has an impact on pregnancy and the outcome of the pregnancy (Beng, 2009; Madan et al., 2006, and Akingbola et al., 2006).

In a cohort study conducted by Harrison on pregnant women in Southern Nigeria and those from South India in 1996, he found that mortality rate was proportional to the period of their pregnancy. Those at the late stage of pregnancy were vulnerable to complaints and consequently death might follow (Harrison, 1966).

Anaemia contributes to low birth weight and miscarriages and it is also a primary cause of low immunity of both the mother and the child, which makes them vulnerable to several infections (Imam and Yahaya, 2008).

Malaria infection especially in the first and second trimesters has been implicated in adverse pregnancy outcomes. It cuases 3-5% of maternal anaemia cases. About 50% million pregnant women are exposed to malaria especially in the high endemic regions(WHO,2004 and Rogerson et al.,2007).

Materials and Methods

Study Area

Umuahia, Abia State, Nigeria

Subjects

Pregnant women and non-pregnant women who visited University Health Services Department of Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria and Me Cure Diagnostic Laboratory Umuahia, Abia State.

Samples and Methods

Venous blood samples were collected from confirmed pregnant women and non-pregnant women into EDTA anticoagulated containers for haematological tests.

Statistical Analysis

The data were analyzed using t-test with significant value set at $P<0.05$.

Ethics

Oral consents were made to the subjects prior to sample collections

Results and Discussion

Table 1 showed significant changes ($P<0.05$) when the mean values of RBC, Haematocrit, and Haemoglobin were compared based on trimesters (between 1st & 2nd trimester,

Table.1 Haematological profile of the pregnant women based on trimester

Parameters	1st Trimester	2nd Trimester	3rd Trimester	1st & 2nd Trimetser	1st & 3rd Trimester	2nd & 3rd Trimester
RBC(*10^{12}/L)	2.91+/-1.2	4.40+/-1.6	3.03+/-2.3	P<0.05	P>0.05	P<0.05
HB(g/dl)	11.6+/-2.1	14.7+/-1.9	12.0+/-3.1	P<0.05	P>0.05	<0.05
HCT(%)	30.2+/-1.8	40.9+/-2.3	31.1+/-3.0	P<0.05	P>0.05	P<0.05
MCV(fl)	91.3+/-2.4	92.9+/-1.5	102.6+/-0.9	P>0.05	P<0.05	P<0.05
MCH(pg)	31.3+/-4.1	33.4+/-2.3	39.5+/-3.0	P<0.05	P<0.05	P<0.05
MCHC(g/dl)	34.2+/-1.6	35.9+/-2.7	38.5+/-1.8	P>0.05	P<0.05	P<0.05
RDW(%)	14.5+/-0.8	15.1+/-1.2	15.5+/-2.2	P>0.05	P>0.05	P>0.05
Platelet(*10^{9}/L)	12O+/-4.7	140+/-3.1	106+/-2.3	P<0.05	P>0.05	P<0.05
MPV(fl)	6.1+/-1.1	5.6+/-1.5	7.2+/-2.1	P>0.05	P>0.05	P<0.05
WBC(*10^{9}/L)	4.8+/-2.6	5.8+/-3.7	7.81+/-1.7	P<0.05	P<0.05	P<0.05
Neutrophils(%)	67.7+/-2.9	52.0+/-1.8	68.0+/-3.2	P<0.05	P>0.05	P<0.05
Lymphocytes(%)	24.6+/-4.7	41.8+/-1.5	24.3+/-2.7	P<0.05	P>0.05	P<0.05
Monocytes(%)	1.2+/-0.8	1.0+/-0.5	1.0+/-1.1	P>0.05	P>0.05	P>0.05
Eosinophils(%)	6.5+/-2.4	5.2+/-1.5	6.7+/-3.3	P<0.05	P>0.05	P<0.05

Table.2 Haematological profile of pregnant women and non-pregnant women (control)

Parameter	Pregnant women	Non-pregnant women	P-Value
RBC(*10^{12}/L)	3.45+/-1.7	5.2+/-2.2	P<0.05
HB(g/dl)	12.8+/-2.4	13.3+/-1.2	P>0.05
HCT(%)	34.1+/-2.4	39.2+/-1.6	P<0.05
MCV(fl)	95.6+/-1.6	102.2+/-0.8	P<0.05
MCH(pg)	34.7+/-2.3	36.4+/-2.5	P<0.05
MCHC(g/dl)	36.2+/-2.0	37.8+/-1.4	P>0.05
RDW(%)	15.0+/-1.4	15.7+/-1.0	P>0.05
WBC(*10^{9}/L)	6.1+/-2.7	4.2+/-1.4	P>0.05
Platelets(*10^{9}/L)	122+/-3.4	198.5+/-5.6	P<0.05
MPV(fl)	6.3+/-1.6	7.2+/-2.3	P>0.05
Neutrophils(%)	62.6+/-2.6	47.3+/-3.2	P<0.05
Lymphocytes(%)	30.2+/-3.0	49.1+/-2.1	P<0.05
Monocytes(%)	1.1+/-0.8	2.4+/-1.3	P<0.05
Eosinophils(%)	6.1+/-2.4	1.2+/-1.7	P<0.05

and 2nd & 3rd trimester),MCV(between 1st & 3rd and 2nd & 3rd trimesters), MCH(all the trimesters) MCHC (1st &2nd and 2nd &3rd trimesters), Platelets (all teh trimesters), MPV (2nd & 3rd trimester), WBC (all the trimesters), Neutrophil,

Lymphocytes and Eosinophils (1st &2nd and 2nd & 3rd trimesters) and showed no significant changes (P>0.05) in the mean values of RBC, Hb, Haematocrit (between 1st & 2nd trimesters),MCV,MCHC and (1st &2nd trimesters),RDW, Monocytes (all the trimesters),MPV(1st & 2nd, and 1st & 3rd trimesters) and Eosinophils(1st & 3rd trimesters) when compared between the trimesters. The study is in accordance with Dapper et al(2001) which showed significant change($p<0.05$) in PCV in the three trimesters but other parameters were not significant($P>0.05$).The study contradicts James et al(2008) which showed highest increase in first trimester, drops in second trimester and rises in third trimester but in this study Hb,PCV,RBC were low in first trimester, highest in second trimester and drop in the 3rd trimester. The study is in line with Osanuga et al (2011) which showed significant difference ($P<0.05$) in PCV, WBC, Eosinophil, Monocytes.The changes in PCV, Hb, RBC could be due to increased plasma volume during pregnancy causing haemodilution.

Table 2 showed significant changes($P<0.05$) in the mean values of RBC, PCV, MCV, RDW, Platelets, WBC, Neutrophils, Lymphocytes, Monocytes, and Eosinophils relative to the non-pregnant women(control) and non-significant changes($p>0.05$).These changes are also attributable to changes in the weight of the foetus with increased requirement for haemantics because of increase in growth and development. Pregnancy outcome is not easily predictable because of these variations in physiological and biochemical parameters.

The study has shown serious changes in most of the trimesters in the haematological parameters which could affect the pregnancy outcomes adversely if not effectively managed. Therefore,the pregnant women should be monitored closely especially their haematological parameters to avoid some adverse outcomes.

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